

Peterborough Utilities Group Services Corp

Water Utility Master Plan

Report

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Executive Summary

1. Background

The Peterborough Utilities Group Services Corp. (PUGSC), which is comprised of several companies, including the Peterborough Utilities Commission (PUC), has retained AECOM Canada Ltd. (AECOM) to complete a Long-Term Water Utility Master Plan (the Master Plan) study. The study is growth focused and provides an efficient and cost effective maintenance and expansion program for the municipal potable water supply system in the City of Peterborough. The Master Plan has been developed in the context of projections on water quality and quantity over the next 15 years from 2018 to 2031. It identifies the preferred water supply and servicing strategy, including the associated capital upgrades needed to provide sustainable municipal water to meet expected growth.

The Peterborough water system currently serves approximately 81,000 people within the City of Peterborough, in addition to customers outside of the City's boundary. This includes water customers in developments in the Township of Selwyn called "Woodland Acres" and in the Township of Otonabee-South Monaghan called "Burnham Meadows". The PUC also provides municipal water to the City's Municipal Airport located in the Township of Cavan Monaghan.

The Master Plan addresses the requirements of the first two phases of the Municipal Class Environmental Assessment (MCEA) manual (October 2000, as amended in 2007, 2011 and 2015), which is approved under the *Ontario Environmental Assessment Act (EAA)*.

2. Master Plan Purpose and Objectives

Developed in the context of projections on water supply over the next 15 years from 2018 to 2031 with a longer term view to 2041, the focus of this Master Plan is growth related infrastructure. The purpose and objectives of the Master Plan are to:

- Provide an efficient and cost effective maintenance and expansion phasing program for the municipal potable water supply system in the City.
- Confirm the preferred water supply and servicing strategy, including the associated capital upgrades necessary to support capital planning for key components of the water supply and distribution system.
- Ensure documentation of the study process complies with Phases 1 and 2 of the MCEA planning process.

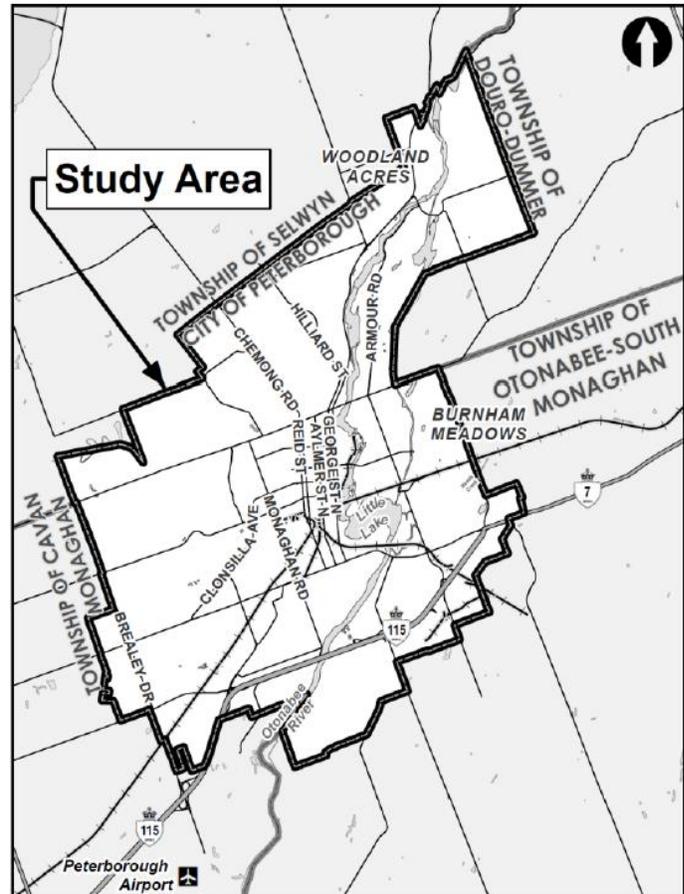


Figure ES-1: Study Area

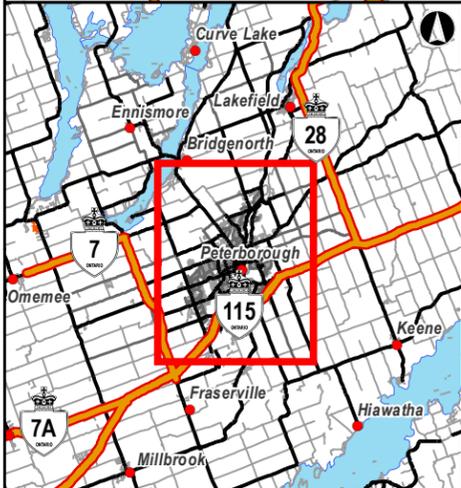
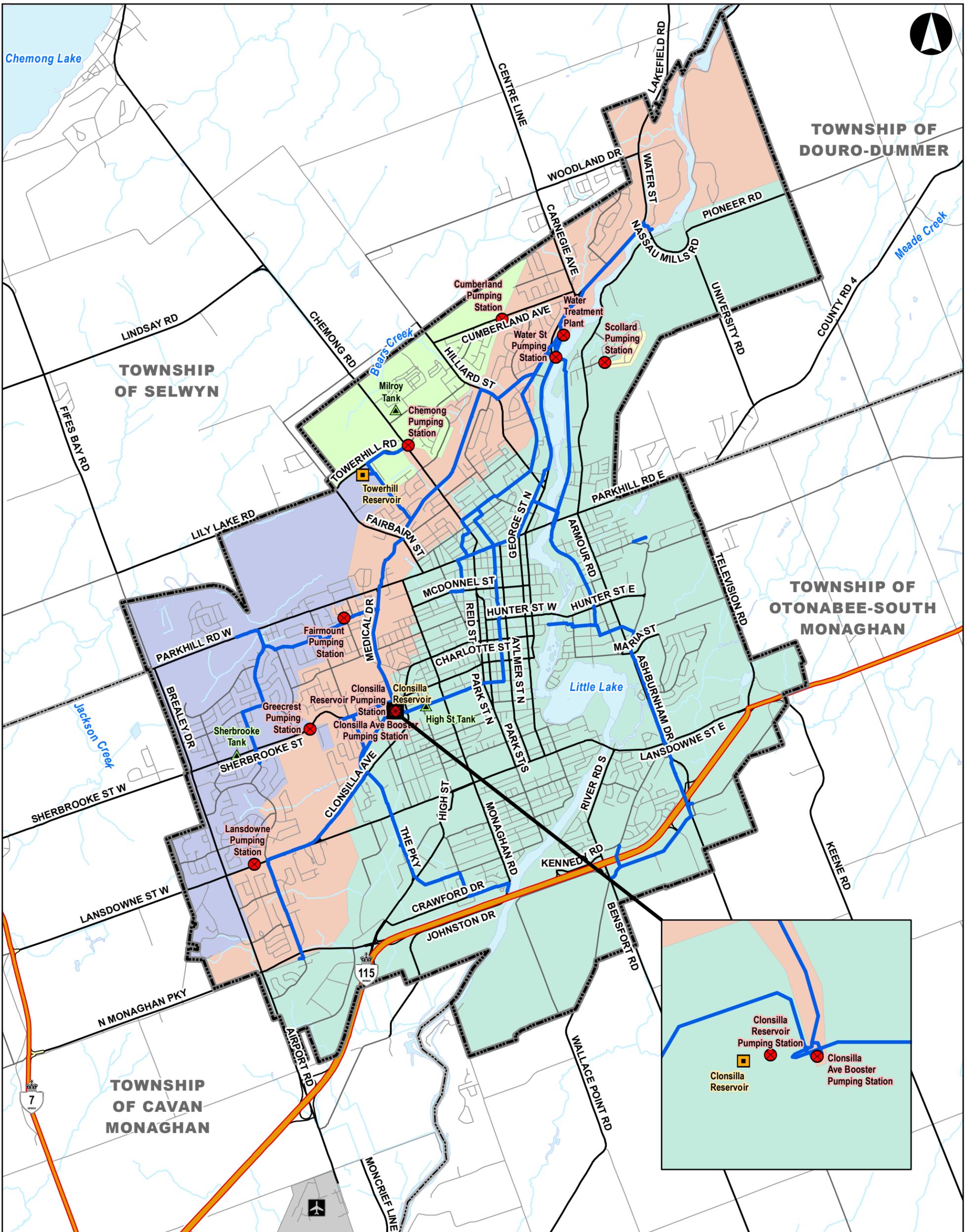
The Master Plan is considered a “living” document that should be regularly updated as the City continues to grow and develop.

3. Peterborough Water Supply and Distribution System – Key Components

Key components of the existing system are summarized as follows:

- Water Treatment Plant (WTP) – receives its water from the Otonabee River. The WTP supplies water to five (5) Pressure Zones, providing service to approximately 81,000 people within the legal boundaries of City of Peterborough, in addition to customers outside the City limits.
- Booster Pumping Stations (BPSs) – supply water to the distribution system. The PUC currently operates ten (10) pumping stations.
- Water Storage Facilities – provide emergency water supply and help regulate pressure in the water distribution system. The PUC currently operates five (5) storage facilities consisting of either elevated tanks or reservoirs.
- Water Distribution System – consists of watermains that connect the source, WTP, pumping stations, water storage facilities and PUC customers. There are approximately 461km of watermain in the PUC water distribution system.

The above components are identified collectively in **Figure ES-2** and individually in **Appendix B**.



Legend

- Pump
- Reservoir
- ▲ Tank
- Watermain (>400 mm)
- Freeway
- Highway
- Major Road
- Ramp
- Collector Road
- Local Road
- Service Road
- Watercourse
- Waterbody
- Peterborough
- City of Peterborough
- Municipal Boundary

Pressure Zone

- 1
- 1B
- 2
- 3N
- 3W

Peterborough Utilities Group Services Corp.
Water Utility Master Plan

Peterborough Water Supply and Distribution System –
Key Components

Kilometers

Sep 2019	1:48,000 <small>* when printed 11"x17"</small>	<small>Datum: NAD 1983 UTM Zone 17N Source: MNRF, City of Peterborough Image:</small>
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AECOM **Figure: ES-2**

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4. Assessment/Recommendations – Existing System

The Master Plan assessed the existing system through a review of pumping capacity, and elevated tank/reservoir storage capacity, including backup pumping capacity, and pipe capacity for the entire modelled water distribution network. City residential and employment forecasts and known/expected approved subdivision developments were integrated in the assessment of the existing system to confirm future water demands. This information also considered 2041 build out scenarios. Water demands were assigned to the pressure zones to establish where storage and pumping surpluses and deficiencies exist.

The results of the hydraulic modelling analysis showed that under the 2041 Peak Hour Demand (PHD) Scenario, there were four areas within the City of Peterborough that would experience low pressure issues. Areas that fall below 40 psi under PHD were High Street Elevated Tank (ET), Corrigan Hill area, Airport Road and Wittington Drive, and Towerhill Reservoir area. Low pressure issues were not related to planned future growth.

The following summarizes the assessment of infrastructure and corresponding recommendations.

A. Peterborough WTP Infrastructure

Total treatment capacity of the WTP is 104 ML/d. Emergency power is supplied by a natural gas generator rated at 990 kW. The total 2041 updated demand projection is 32 ML/d for Average Day Demand and 100 ML/d for Peak Hour Demand (PHD). Comparing existing treatment capacity against future demand shows that the WTP has enough capacity to meet long term growth.

WTP Recommendations: No growth related upgrades to the existing WTP are recommended.

B. Storage and Pump Capacity Evaluation

The evaluation of storage capacity was based on the Ministry of the Environment, Conservation and Parks (MECP) storage requirement calculation. The assessment and evaluation of pump capacity and storage capacity confirmed the following:

- Zone 1:
 - Zone 1 has sufficient storage capacity to meet the combined storage capacity for Zone 1 and Zone 1B requirement as per MECP storage requirement calculation.
 - Existing Zone 1 floating storage capacity (High Street Elevated Tank 4.5 ML) meets the emergency storage requirement.
 - Fire flow and equalization storage requirements are supplied via pumping at Clonsilla Reservoir Zone 1 Booster Pumping Station.
 - Zone 1 has sufficient pump capacity to meet the Maximum Day Demand (MDD) + Fire Flow (FF) design conditions.
 - Zone 1 Water Street Pump house has the ability to provide pressure modulation for storage equalization needs.
- Zone 1B:
 - Zone 1B is a direct pressure system where storage facility is not available.
 - Equalization storage requirement is pumped via Scollard Drive Booster Pumping Station (BPS).
 - Fire flow and emergency supplies are provided by Zone 1 via a check valve on Scollard Drive at Cunningham Drive.

- Zone 2:
 - The Towerhill Reservoir has sufficient storage capacity for the equalization, fire and emergency storage requirements as per MECP storage requirement.
 - For Zone 2, pump capacity requirements are determined based on the Maximum Day Demand conditions because Towerhill Reservoir is able to meet the storage requirements (equalization, fire and emergency storage).
 - Clonsilla Reservoir BPS and WTP High Lift pumps satisfy the pumping requirements.
- Zone 3N:
 - Existing storage capacity (Milroy Elevated Tank 0.45 ML) meets equalization storage requirement only.
 - Fire flow and emergency supply are supplied via pumping at Chemong and Cumberland pumping stations.
- Zone 3W:
 - Existing storage capacity (Sherbrooke Elevated Tank 2.27 ML) meets equalization storage requirement only.
 - Fire flow and emergency storage supply must be supplied via Fairmount, Greencrest, and Lansdowne pumping stations.
- Zone 3N and 3W Combined:
 - The PUC is in the process of combining the Zone 3N and Zone 3W into a single Zone 3 for hydraulic purposes. Combining the zones increases the total storage capacity and total pumping capacity for Zone 3. Zone 3 would be serviced by five (5) BPSs: Chemong BPS, Cumberland BPS, Fairmount BPS, Greenhill BPS, and Lansdowne BPS. The existing pumping capacity is sufficient to meet the required pumping based on the projected population growth; however, Lansdowne BPS and Chemong BPS are approaching the end of their service life without major capital upgrades.

BPS Recommendations: Combine Zone 3N and Zone 3W into a single Zone 3. Monitor condition of the Lansdowne BPS and Chemong BPS for replacement based on station age.

The High Street ET is a strategic asset that provides storage in emergency situations. The ET is nearing its expected service life without repairs. The rehabilitation of the ET versus constructing a new ET at a new location on or adjacent to the current site was evaluated as part of the Master Plan (See **Appendix D**). The evaluation considered structural condition and service life review for the High Street ET, and detailed cost analysis in comparison to building a new ET. The results of the evaluation indicate that repairing and recoating the High Street ET is the preferred storage option. The estimated cost for the repair is approximate \$4.4 Million, saving at least \$4.0 Million over those of the replacement options, as well as avoiding the need to acquire land.

Water Storage Facilities Recommendation: Combine Zone 3N and Zone 3W into a single Zone 3. Rehabilitate High Street ET.

C. Water Distribution System – Watermains

From the storage and pump capacity assessment above it is evident that there is insufficient storage in Zone 3N and Zone 3W to meet the MECP storage requirements. However, Zone 2 existing storage capacity is sufficient to cover the storage requirement in the combined Zone 3 with sufficient pumping. The existing BPSs in the Zone 3 have enough pumping capacity to transfer the required fire and emergency storage volume. Therefore, connecting Zone 3W and Zone 3N is recommended. This connection maximizes the use of the existing pumping infrastructure, minimizes the overall capital investment, enhances operational flexibility and provides resilience in the event of an emergency.

Water Distribution System Recommendations: Connect Zone 3W and Zone 3N via proposed 300mm diameter PVC watermain that follows Lily Lake Road and connects to Parkhill Road at Chandler Crescent. This work is scheduled to proceed as part of the Lily Lake subdivision development.

5. Water System Recommendations – MCEA Planning Schedule Confirmation

Water system recommendations have been informed by the Preliminary Water Servicing Strategy Review (**Appendix B**) and High Street Elevated Tank (**Appendix D**) technical memorandums, which together integrate the City's residential and employment forecasts and known/expected approved subdivision developments.

Table ES-1 summarizes the recommended infrastructure and MCEA project planning schedule (Schedule A or A+), as applicable.

Table ES-1: Recommended MCEA Projects

Category	Infrastructure	MCEA Schedule	Future Documentation, Studies or Consultation Opportunities	Implementation
Pressure Zone 1				
Storage Facility	High Street ET: <ul style="list-style-type: none"> Repair for further 40 years of service life – High Street ET has enough capacity to meet long term growth. 	<ul style="list-style-type: none"> Schedule A – Normal or emergency operational activities which may include but are not limited to repairs and renovations to treatments and pumping plan equipment, water storage facilities distribution mains and appurtenances. 	<ul style="list-style-type: none"> PUC is proceeding with design in 2019. Considering surrounding land uses it is recommended that adjacent land owners (i.e. within 120m) be notified of the project before construction starts. The PUC should also consider hosting a public drop in meeting where property owners-residents can review and understand proposed construction, mitigation measures and schedules. 	<ul style="list-style-type: none"> Short Term (1-5 years)
Pressure Zone 1B				
WTP	Peterborough WTP: <ul style="list-style-type: none"> None identified. 	<ul style="list-style-type: none"> Not applicable – No growth related upgrades. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Not applicable
Pressure Zone 2				
--	No identified projects.	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Not applicable. 	<ul style="list-style-type: none"> Not applicable
Pressure Zone 3 (3N and 3W Combined)				
Pumping Facility	Chemong BPS: <ul style="list-style-type: none"> Pressure Zone 3N. Approaching end of service life within next 10 years without major capital upgrades. Monitor for retirement and upgrade triggers. 	<ul style="list-style-type: none"> Schedule A+ – for BPS retirement. Schedule B – for new BPS or upgrade. 	<ul style="list-style-type: none"> Requires public notice prior to construction for BPS retirement. Potential future Schedule B EA. 	<ul style="list-style-type: none"> Mid Term (5-10 Years)
Pumping Facility	Cumberland BPS: <ul style="list-style-type: none"> Pressure Zone 3N. Total pumping capacity for Zone 3 can be maintained by increasing pumping capacity at Cumberland BPS. Upgrades to the BPS can be made within the existing footprint. 	<ul style="list-style-type: none"> Schedule A – increasing BPS capacity by adding or replacing equipment where new equipment is located in an existing building or structure, and where the existing rated capacity is not exceeded 	<ul style="list-style-type: none"> No public notice required for BPS upgrades. Requires public notice prior to construction for pipe connection upgrades. 	<ul style="list-style-type: none"> Mid Term (5-10 Years)

Category	Infrastructure	MCEA Schedule	Future Documentation, Studies or Consultation Opportunities	Implementation
	<p>Of the station (no building expansion), with consideration given to upgrades to standby power¹ supply at the station.</p> <ul style="list-style-type: none"> Upgrades to the pipe connections to and from Cumberland Ave. to the Cumberland BPS need to be upgraded to minimum of 350mm diameter to maintain acceptable pipe velocities. 	<ul style="list-style-type: none"> Schedule A+ – establish, extend, or enlarge a water distribution system in existing/future road allowance and utility corridor. 		
Pumping Facility	<p>Lansdowne BPS:</p> <ul style="list-style-type: none"> Pressure Zone 3W. Approaching end of service life within next 10 years without major capital upgrades. Monitor for upgrade triggers. 	<ul style="list-style-type: none"> Schedule A+ – for BPS retirement. Schedule B – for new BPS or upgrade. 	<ul style="list-style-type: none"> Requires public notice prior to construction for BPS retirement. Potential future Schedule B EA. 	<ul style="list-style-type: none"> Mid Term (5-10 Years)
Water Distribution Network – Watermains	<p>Distribution System – Watermain:</p> <ul style="list-style-type: none"> Connect Zones 3N and 3W via Lily Lake Road and Lily Lake Development to form a single Pressure Zone 3. The above connection requires a trenchless crossing of Jackson Creek from an existing cul-de-sac (watermain) off of Chandler Crescent to the Lily Lake Development. 	<ul style="list-style-type: none"> Schedule A+ – watermain in existing/future road allowance and utility corridor (Jackson Creek crossing by trenchless methods and is in existing utility corridor). 	<ul style="list-style-type: none"> Requires public notice prior to construction. 	<ul style="list-style-type: none"> Short Term (1-5 years)

¹ Under O. Reg 116/01: Electricity projects, installation or replacement of standby power equipment where new equipment is located in a new building or structure is exempt from the EA Act if the equipment is a generation facility within the meaning of O.Reg 116/01, is constructed for the purpose of providing electricity to the site where the generation facility is located in the event of a failure of a distributor to deliver electricity to the site, and is carried out by Her Majesty in Right of Ontario, a municipality or a public body as defined in the EA Act.

6. Conclusion and Next Steps

The preferred servicing strategy is to pump surplus storage from Zone 2 to future Zone 3 growth areas, connect Zone 3 North and Zone 3 West via the Lily Lake subdivision development and to rehabilitate the High Street Elevated Tank (ET). The MCEA process concluded that all proposed projects are considered Schedule A or A+ as per the MEA MCEA manual, and as such, are pre-approved, subject to notifying the public prior to construction.

The recommendations for next steps are as follows:

- The PUC proceed with the design, tender and construction of the above projects, including public notification.
- The public notice for the rehabilitating the High Street ET is circulated to all property owners surrounding the ET. The notice may also offer an opportunity for a drop in project review meeting.
- The PUC continue to monitor and update this Master Plan as described in **Section 8**.

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Appendix C.	Preliminary Water Servicing Strategy Review Technical Memorandum
Appendix D.	High Street Elevated Tank Review Memorandum and MCEA Evaluation
Appendix E.	Consultation

List of Acronyms

ADD	Average Daily Demand
BPS	Booster Pumping Station
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
EAA	Environmental Assessment Act
ESR	Environmental Study Report
ET	Elevated Tank
FF	Fire Flow
GAC	Granulated Activated Carbon
GGH	Greater Golden Horseshoe
GIS	Geographic Information System
HVA	Highly Vulnerable Aquifer
IPZ	Intake Protection Zone
LWL	Low Water Level
MCEA	Municipal Class Environmental Assessment
MDD	Maximum Day Demand
MEA	Municipal Engineers Association
MECP	Ministry of the Environment, Conservation and Parks
MNRF	Ministry of Natural Resources and Forestry
MTCS	Ministry of Tourism, Culture and Sport
OP	Official Plan
ORCA	Otonabee Region Conservation Authority
PHD	Peak Hour Demand
PPS	Provincial Policy Statement
PUC	Peterborough Utilities Commission
PUGSC	Peterborough Utilities Group Services Corp
PVC	Polyvinyl Chloride
SGRA	Significant Groundwater Recharge Area
TAZ	Traffic Analysis Zone
TDH	Total Dynamic Head
THM	Trihalomethanes
TWL	Top Water Level
UV	Ultraviolet
WHPA	Wellhead Protection Areas
WTP	Water Treatment Plan

1. Introduction

1.1 Background

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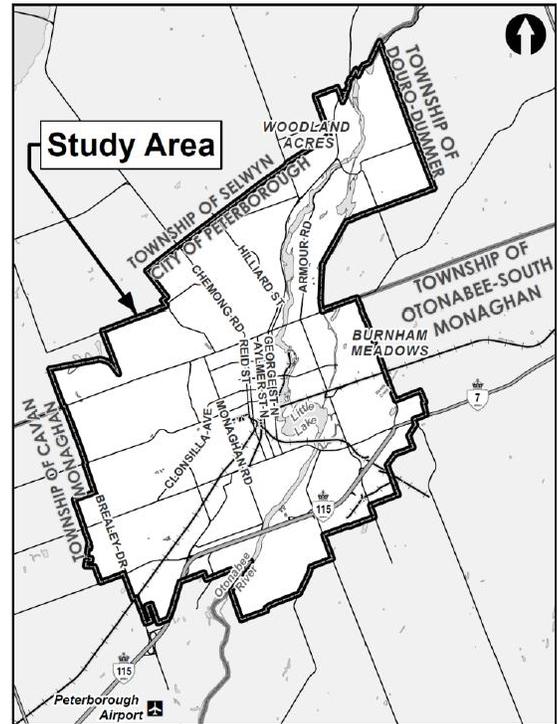


Figure 1-1: Study Area

The Master Plan addresses the requirements of the first two phases of the Municipal Class Environmental Assessment (MCEA) manual (October 2000, as amended in 2007, 2011 and 2015), which is approved under the *Ontario Environmental Assessment Act (EAA)*.

1.2 PUGSC – Structure and Mandate (Water)

The Peterborough Utilities Group Services Corp (PUGSC) is comprised of several companies, including the unregulated company, Peterborough Utilities Inc.; the services company, Peterborough Utilities Services Inc.; the water company, through the Peterborough Utilities Commission (PUC), and the regulated Local Distribution Company, Peterborough Distribution Inc. The Riverview Park and Zoo is also part of the group and operated by the Peterborough Utilities Commission.

The PUC is responsible for maintaining its municipal infrastructure and supplying all of Peterborough residents and businesses with safe, clean water. Each year the PUC lab tests thousands of water samples to ensure that Peterborough's drinking water is safe and aesthetically pleasing.

1.3 Master Plan Purpose and Objectives

Developed in the context of projections on water quality and quantity over the next 15 years from 2018 to 2031 with a longer term view to 2041, the focus of this Master Plan is growth related infrastructure. The purpose and objectives of the Master Plan are to:

- Provide an efficient and cost effective maintenance and expansion phasing program for the municipal potable water supply system in the City.
- Confirm the preferred water supply and servicing strategy, including the associated capital upgrades necessary to support capital planning. Recommendation are provided regarding the following infrastructure:
 - Water Treatment Plant (WTP)
 - Booster Pumping Stations (BPSs)
 - Water Storage Facilities
 - Distribution System – Watermains
- Ensure documentation of the study process complies with Phases 1 and 2 of the MCEA planning process.

The Master Plan is considered a “living” document that should be regularly updated as the City continues to grow and develop.

1.4 Planning Horizon

The existing City of Peterborough population information (2018) was updated using the current Census population information and Traffic Area Zone Geographic Information System (GIS) layer. The projected population and employment information is derived from the planning information made available by the PUC. The PUC, through the City’s Planning and Development Services Department, provided a Subdivision Activity Map that outlines the projected development activity, projected number of units, type of units and the phasing of each development. This information forms the basis for the planning horizon. Furthermore, the planning horizon was divided based on anticipated phasing of the proposed developments; 2018-2031 and Beyond 2031. Using the information provided by PUC, City of Peterborough population was projected in 5-year increments from 2018 to 2031 and the 2041 was used as the ultimate planning horizon. The residential and employment population growth is summarized in **Figure 1-2**. **Table 1-1** summarizes the information provided by PUC regarding the proposed development activity and serves as a reference for the Subdivision Activity Map (**Figure 1-3**).

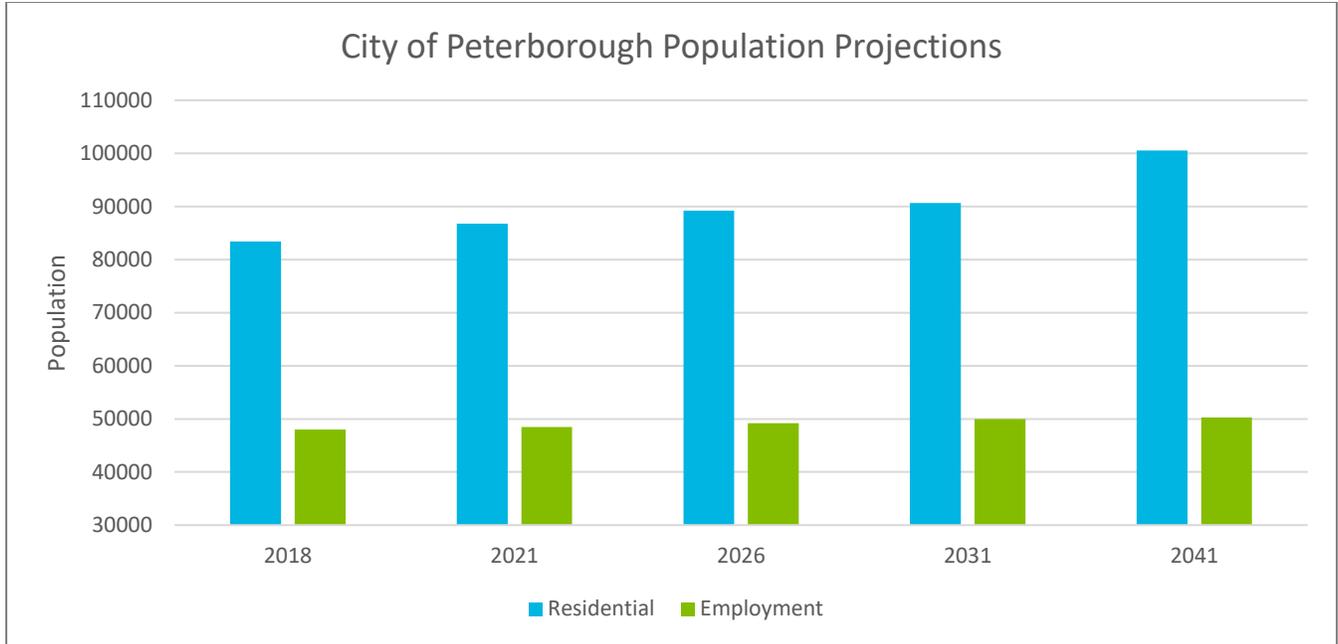


Figure 1-2: City of Peterborough Residential and Employment Population Projections

Table 1-1: Subdivision Activity Map Summary by Proposed Development

Key Map # (See Figure 1-3)	Low Density Units	Medium Density Units	High Density Units	Commercial Land (ha)	Total Units #	Zone	Planning Horizon	Population Equivalent
4	360	191	0	-	551	3W	2018-2031	1,738
12	41	0	0	-	41	1	Beyond 2031	144
13	92	222	0	-	314	1	Beyond 2031	877
14	409	135	0	-	544	1	Beyond 2031	1,769
3	857	441	442	-	1740	3W	Beyond 2031	4,853
8	-	-	-	19.39	-	-	2018-2031	2,266
10A	501	56	150	-	707	1	2018-2031	2,149
7	35	0	0	-	35	2	2018-2031	123
2	342	168	0	-	510	3W	2018-2031	1,617
6A	233	0	91	-	324	3N	2018-2031	970
6B	70	143	0	-	213	3N	2018-2031	603
1	163	40	0	-	203	3W	Beyond 2031	671
9	41	89	0	-	130	1	Beyond 2031	366
10B	-	-	-	-	0	1	Beyond 2031	-
5	179	164	0	-	343	3W	Beyond 2031	1,037
11	58	0	0	-	58	1	2018-2031	203
Totals	3,381	1,649	683		5,713		Residential Employment	17,117 2,266

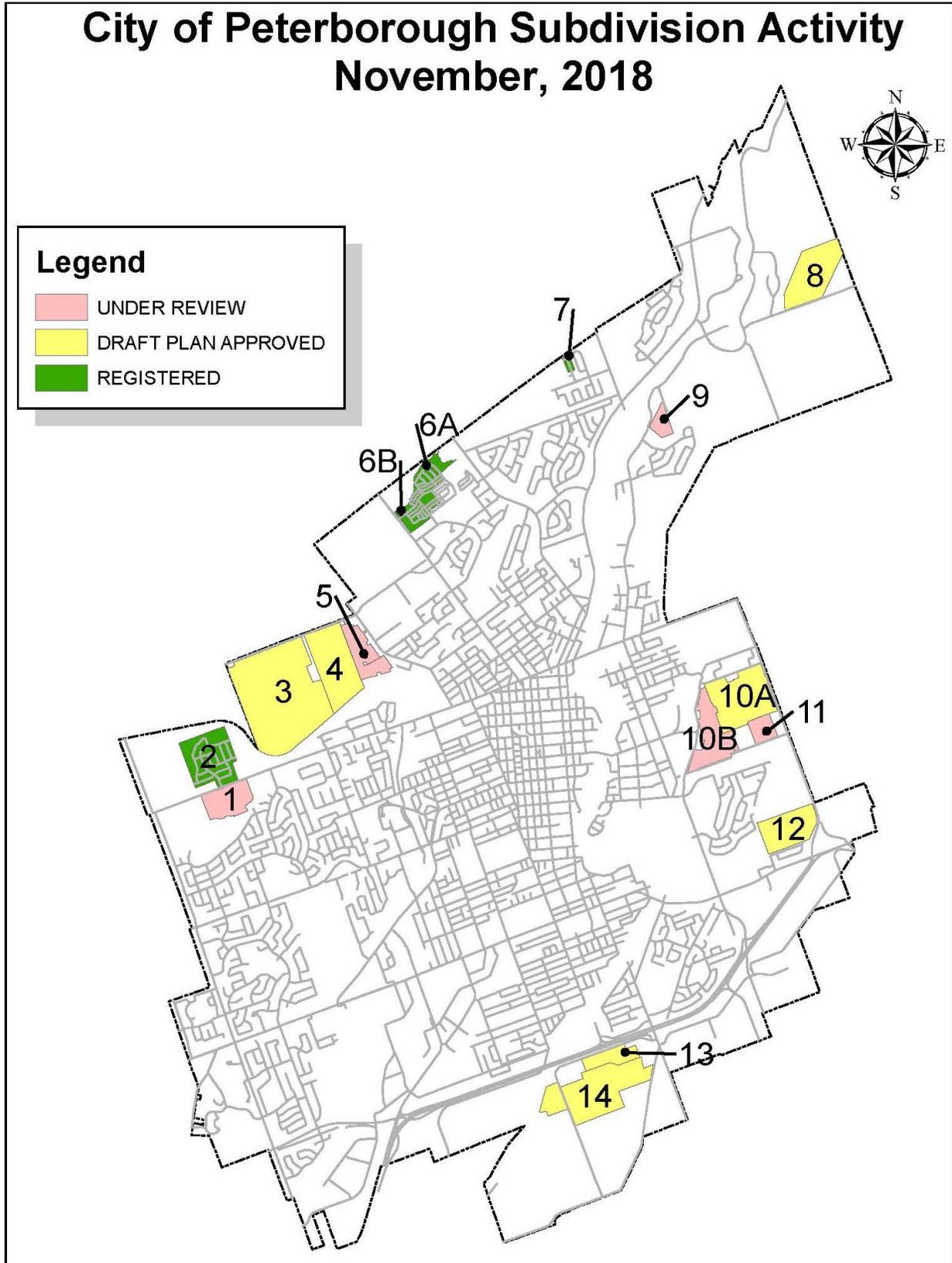


Figure 1-3: Subdivision Activity Map (City of Peterborough, November 2018)

1.4.1 2018 – 2031

Based on the future development, the residential population is projected to grow by 7,401 and employment population is projected to grow by 2,266 from 2018 to 2031.

1.4.2 Beyond 2031

Based on the future development trends the residential population is projected to grow by 9,716. No employment population growth is projected beyond 2031.

1.5 Study Area

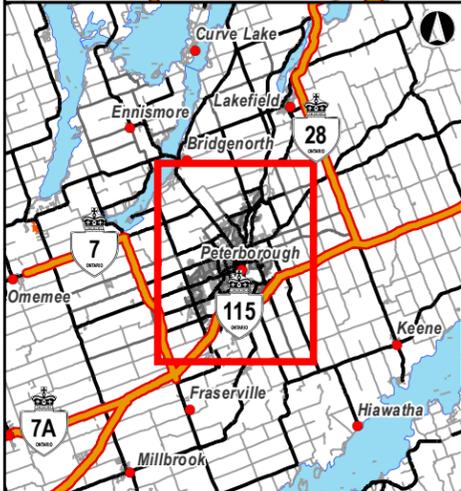
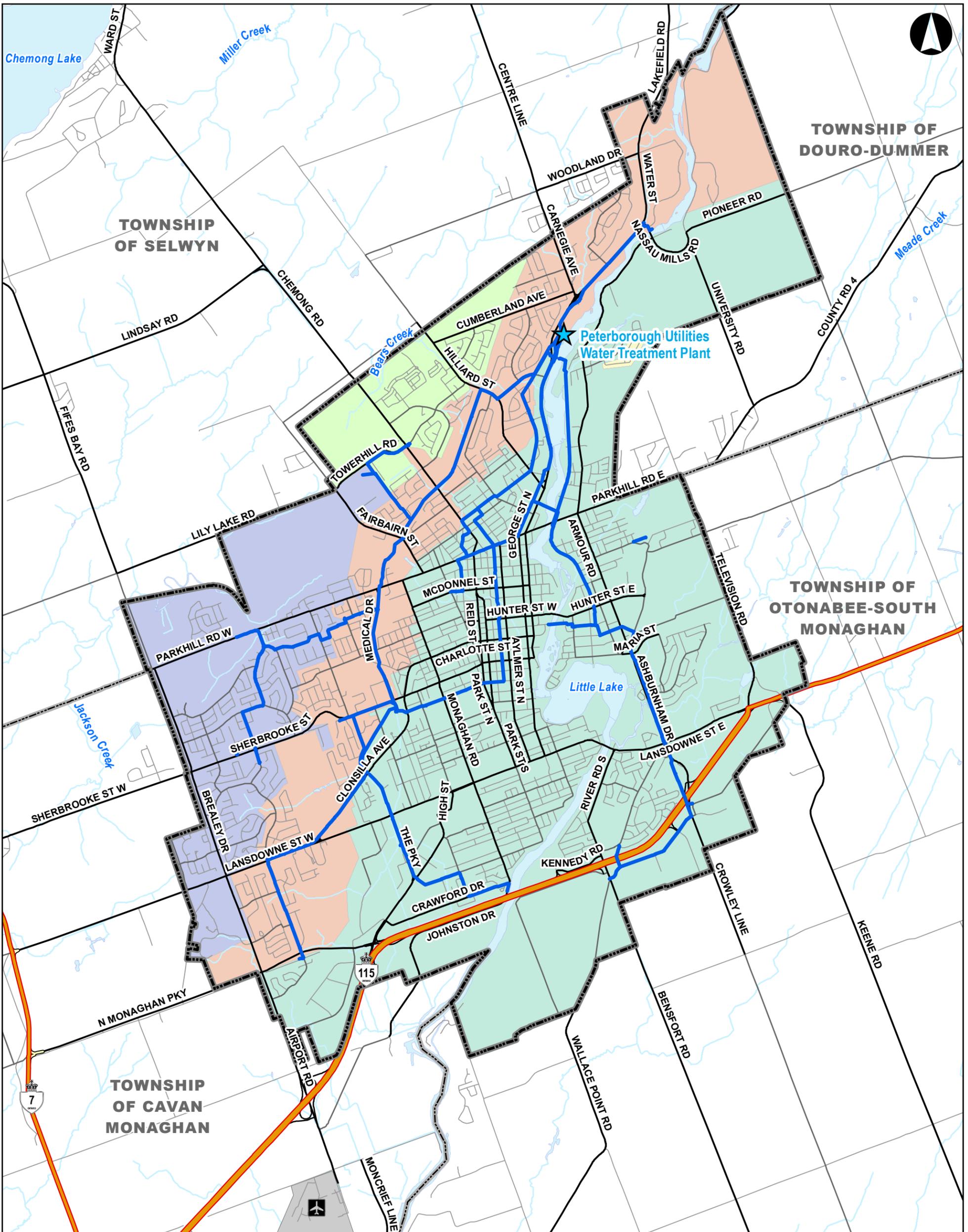
The study area, as shown in **Figure 1-4**, encompasses all lands within the legal boundaries of the City of Peterborough. The Peterborough Water Treatment Plant (WTP) supplies water to five (5) Pressure Zones (**Figure 1-4**) serving approximately 81,000 people within the City's legal boundaries, in addition to customers outside of the City limits, as discussed hereafter.

1.5.1 Customers Outside of City Urban Boundary

The Peterborough water system currently serves customers outside of the City's municipal boundary. This includes two (2) small developments in separate Municipalities; approximately 550 people in the Township of Selwyn called "Woodland Acres" and approximately 158 people in the Township of Otonabee-South Monaghan called "Burnham Meadows". The PUC also provides municipal water to the City's Municipal Airport located in the Township of Cavan Monaghan.

1.5.2 Cold Spring Development

The City's Official Plan (OP) includes a secondary land use plan for the Coldsprings growth area, located in the southeast quadrant of the City. The City recently passed a bylaw to establish development charges for the Coldsprings growth area, which will be supported by future municipal servicing reviews and EA studies. For the purposes of this Master Plan servicing, the Coldsprings growth area is beyond 2031.



Legend

- Peterborough Utilities Water Treatment Plant
- Watermain (>400 mm)
- Freeway
- Highway
- Major Road
- Ramp
- Collector Road
- Local Road
- Service Road
- Watercourse
- Waterbody
- Peterborough
- City of Peterborough
- Municipal Boundary

Pressure Zone

- 1
- 1B
- 2
- 3N
- 3W

Peterborough Utilities Group Services Corp.
Water Utility Master Plan

Study Area and Existing Pressure Zones

0 0.5 1 2 3
Kilometers

Aug 2019	1:48,000 * when printed 11"x17"	Datum: NAD 1983 UTM Zone 17N Source: MNRF, City of Peterborough Image:
P#: 60566558	V#: 01	

AECOM **Figure: 1-4**

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1.6 Study Team Organization

The Master Plan was undertaken in collaboration between AECOM and the PUC. The key study team members are identified below:

- Kevin Conlin, PUC Project Manager (PUC)
- Pat Devlin, VP Water (PUC)
- Michael Meyers, Manager Water Utility (PUC)
- René Gagnon, Manager Water Treatment Plant (PUC)
- Frikkie Becker, Consultant Project Manager (AECOM)
- Benny Wan, Hydraulic Modelling Lead (AECOM)
- Hassan Erfanirad, Process Engineer (AECOM)
- Semyon Chaymann, Infrastructure Analyst (AECOM)
- Karl Grueneis, EA Lead (AECOM)
- Samantha Zandvliet, EA Process and Consultation (AECOM)
- Amalia Walker, GIS Specialist (AECOM)

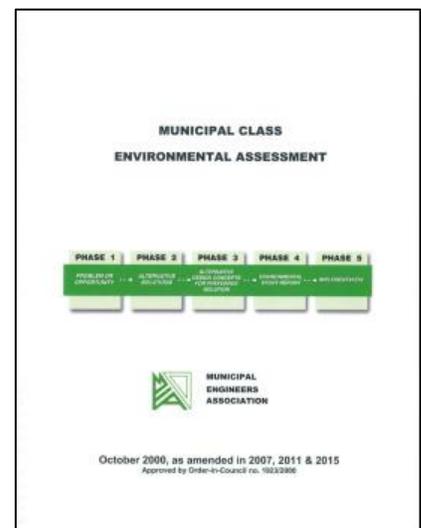
1.7 Municipal Class Environmental Assessment Process

1.7.1 Overview

All municipalities in Ontario are subject to the provisions of the Ontario *Environmental Assessment Act (EAA)* and its requirements to prepare an EA for applicable public works projects. The Ontario Municipal Engineers Association (MEA) “Municipal Class Environmental Assessment” manual (October 2000, as amended in 2007, 2011 and 2015) provides municipalities with a phased planning procedure, approved by the Minister of Environment, Conservation and Parks (MECP), to plan and undertake all municipal sewage, water, stormwater management and transportation projects that occur frequently, are usually limited in scale and have a predictable range of environmental impacts and applicable mitigation measures.

In Ontario, the Municipal Class Environment Assessment (MCEA) process applies to municipal infrastructure projects that must follow a series of mandatory steps as outlined in the MCEA manual. The MCEA manual consists of five (5) phases and the application of the phases depends on the MCEA project planning schedule that applies to a project. The phases are summarized below:

- **Phase 1 – Problem or Opportunity:** Identify the problems or opportunities to be addressed and the needs and justification.
- **Phase 2 – Alternative Solutions:** Identify alternative solutions to the problems or opportunities by taking into consideration the existing environment, and establish the preferred solution taking into account public and agency review and input.



- **Phase 3 – Alternative Design Concepts for the Preferred Solution:** Examine alternative methods of implementing the preferred solution based upon the existing environment, public and agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.
- **Phase 4 – Environmental Study Report:** Document in an Environmental Study Report (ESR), a summary of the rationale, planning, design and consultation process for the project as established through Phases 1 to 3 above and make the documentation publicly available for review.
- **Phase 5 – Implementation:** Complete contract drawings and documents, proceed to construction and operation, and monitor construction for adherence to environmental provisions and commitments. Also, where special conditions dictate, monitor the operation of the completed facilities.

The Master Plan follows phases 1 and 2 of the MCEA planning process. **Appendix A** provides an overview of the MCEA process.

1.7.2 Planning Project Schedules

The MCEA defines four (4) types of projects and the processes required for each (referred to as Schedule A, A+, B, or C). The selection of the appropriate schedule is dependent on the anticipated level of environmental impact, and for some projects, the anticipated construction costs. Projects are categorized according to their environmental significance and their effects on the surrounding environment. Planning methodologies are described within the MCEA and are different according to Class type, such as the following:

- Schedule A:** Projects are limited in scale, have minimal adverse environmental effects and include a number of municipal maintenance and operational activities. These projects are pre-approved and may proceed to implementation without following the full MCEA planning process.
- Schedule A+:** The purpose of Schedule A+ is to ensure appropriate public notification for certain projects that are pre-approved under the MCEA. The manner in which the public is advised is determined by the proponent.
- Schedule B:** These projects generally include improvements and minor expansions to existing facilities and have the potential for some adverse environmental effects. The proponent is required to undertake a screening process (Phases 1 and 2), involving mandatory contact with directly affected public, relevant review agencies and Indigenous communities to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation. At the end of Phase 2, a Project File documenting the planning process followed through Phases 1 and 2 shall be finalized and made available for review. However, if a concern is raised which cannot be resolved, a Part II ²Order may be requested and considered by the Minister of the Environment, Conservation and Parks (MECP). Alternatively, the proponent may elect voluntarily to plan the project as a Schedule C undertaking.
- Schedule C:** Such projects generally include the construction of new facilities and major expansion to existing facilities. These projects have the potential for significant adverse environmental

² The Part II Order is the legal mechanism whereby the status of an undertaking can be elevated from an undertaking within a Class EA to higher level of review, including an Individual EA. Anyone may request the Minister of the Environment, Conservation and Parks (MECP) to issue a Part II Order to require a project proponent to prepare an individual EA. As of July 1, 2018, you must use a Part II Order Request Form to make a request. The Minister may also issue a Part II Order. The options the Minister has for a decision on a Part II Order Request as follows: a) refer the matter to mediation before making a decision, b) deny the request for a Part II Order, with or without conditions, and permit the proponent to proceed with the project, c) require the proponent to comply with the Part II Order and prepare terms of reference and an individual Environmental Assessment before proceeding with the project.

effects and must proceed under the full planning and documentation (Phases 1 to 4) procedures specified in the MCEA manual. Schedule C projects require that an ESR be prepared and filed for review by the public and review agencies. If concerns are raised that cannot be resolved, then a Part II Order may be requested.

The MCEA process ensures that all projects are carried out with effectiveness, efficiency and fairness, allowing for a planning process that is easily traceable.

1.7.3 MCEA Master Planning Process

The MEA MCEA manual recognizes that, in many cases, it is beneficial to utilize the master planning process for projects which have common elements, looking at the overall infrastructure system. The PUC has employed the Master Plan approach based on the following:

- The scope of Master Plans is broad and includes an analysis of the system to outline a framework for future infrastructure rather than focusing on a site-specific problem.
- The Master Plan recommends a set of works which are distributed geographically throughout the study area, some of which may be implemented over a period of time. Collectively, the proposed works are part of the larger infrastructure system.

The MEA MCEA manual outlines four (4) approaches to the master planning process. At a minimum, Master Plans address the first two phases of the MCEA process. This MCEA commenced by following Master Plan Approach #2. Master Plan Approach # 2 involves the preparation of a Master Plan document (i.e., Master Plan Project File Report) at the conclusion of Phases 1 and 2 of the MCEA process where the level of investigation, consultation and documentation are sufficient to fulfill the requirements for all Schedule B projects.

For this study, the preferred strategy and associated recommended infrastructure projects are considered Schedule A/A+ projects. The projects, including their planning schedules, are summarized in **Section 7**. Following the confirmation that all projects are Schedule A or A+, the PUC and its consultant (AECOM) issued a Notice of EA Process Closure since the completion of MCEA Phases 1 and 2 were no longer applicable (i.e., no Schedule B projects were identified).

1.7.4 MCEA Documentation

The Master Plan report completes the planning stage of the study. The Notice of EA Process Closure was published and circulated in order to notify the public and stakeholders regarding the study's outcome of recommended Schedule A and A+ projects and that no further public contact will occur (e.g. no Public Information Centres or Notices of Completion) other than notices prior to construction occurring.

2. Planning Considerations

2.1 Provincial Policy Statement

The 2014 Provincial Policy Statement (PPS) provides policy direction on matters related to land use planning and development and applies to any land use planning decisions made under the Planning Act by municipal councils, local boards, planning boards, provincial ministers, provincial government and agency officials. Regional and municipal planning decisions are to be consistent with the policies of the PPS.

The key sections of policies relevant to this study are as follows:

- 1.1 Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns
- 1.2 Coordination
- 1.6 Infrastructure and Public Service Facilities
- 2.1 Natural Heritage
- 2.2 Water
- 2.6 Cultural Heritage and Archaeology
- 3.0 Protecting Public Health and Safety

Relevance to Study: The PPS was reviewed and considered in developing the Master Plans Problem/Opportunity Statement (**Section 4**). The preferred strategy and recommended works improves the efficiency of the system and address growth to meet current and projected water demands.

Consistent with Policy 1.6.3, prior to developing new infrastructure, consideration of that existing was reviewed. For example, an evaluation was completed for the rehabilitation of the High Street Elevated Tank (ET) versus constructing a new ET at a new location on or adjacent to the current site. This evaluation confirmed the repair of the High Street ET, thereby optimizing existing infrastructure.

Policy 1.6.6.1 identifies that planning for water services shall, among others, integrate servicing and land use considerations at all stages of the planning process. Existing and expected subdivision developments were considered and integrated in this Master Plan to confirm future water demands in the City.

2.2 Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe, 2019, was established and approved under the *Places to Grow Act, 2005*. All decisions regarding planning matters must conform with the Growth Plan. The Growth Plan's framework supports complete communities, which includes a strong economy, a clean and healthy environment, and social equity. The Growth Plan's infrastructure framework entails ensuring an integrated approach to planning, including the optimization of existing infrastructure, where feasible, prior to building new infrastructure.

The Growth Plan sets out population and employment forecasts for all upper and single tier municipalities in order to better coordinate planning and accommodate growth in complete communities within the Greater Golden Horseshoe (GGH).

Relevance to Study: The study area is located within the outer ring of the Greater Golden Horseshoe Growth Plan Area. The Growth Plan identifies the City of Peterborough as an Urban Growth Centre, which is identified as mixed-use, high density and public oriented developments which are meant to become focal points. As per Section 3.2.1 of the Growth Plan, this study supports planning for new infrastructure in an integrated manner. The preferred strategy and recommended works improves the efficiency of the system and addresses growth.

2.3 City of Peterborough Official Plan

The City of Peterborough Official Plan (OP) (December 31, 2017 Consolidation) provides the framework for long-term growth and development in the City. This includes direction policy regarding infrastructure. The City is currently in the process of completing an update to its OP.

Key applicable sections of the OP include:

- 2.4.11 Infrastructure and Public Service Facilities
- 2.4.12 Sewage and Water
- 7.0 Sequence of Development and Servicing Policy

Relevance to Study: The preferred strategy and recommended works improves the efficiency of the system and addresses growth to meet current and projected water demands in a phased manner.

2.4 Trent Source Protection Plan

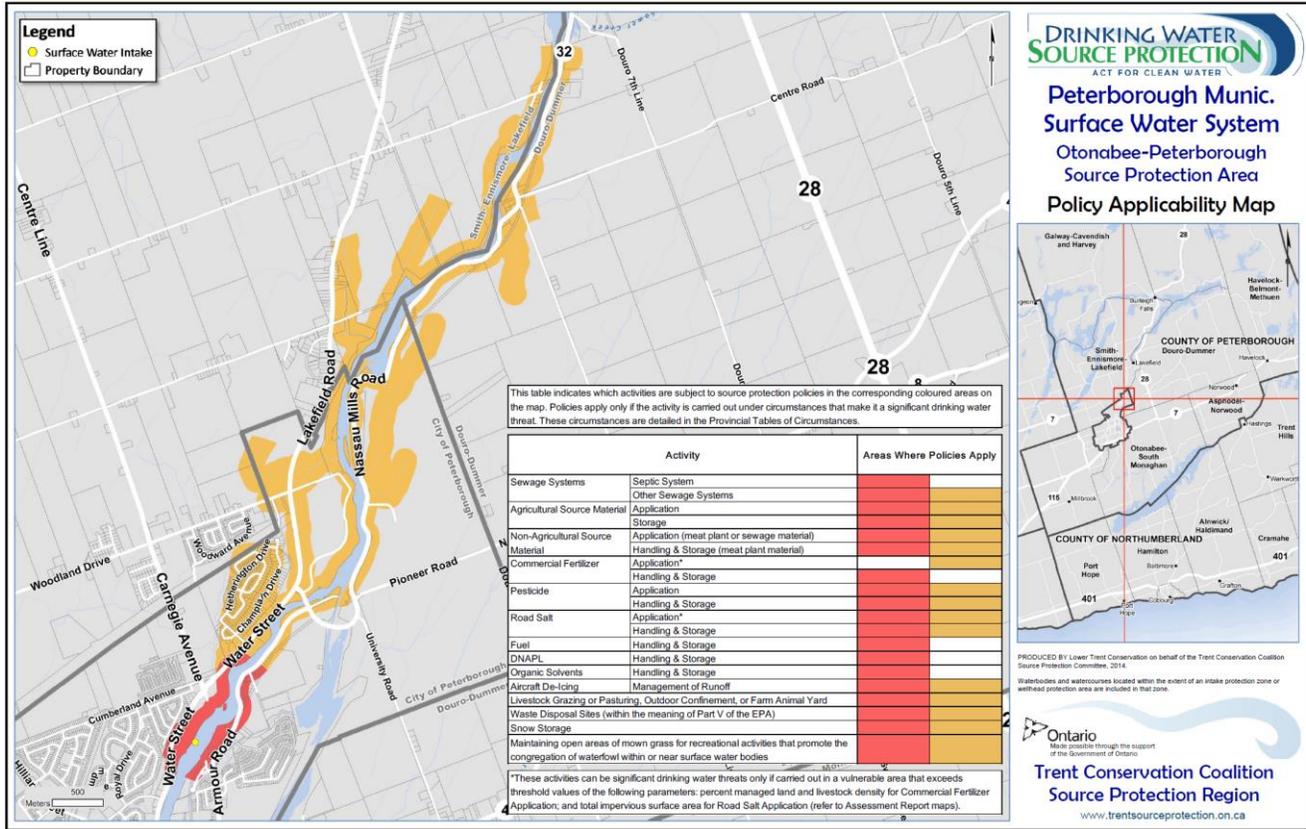
The Trent Conservation Coalition Source Protection Region consists of five (5) Source Protection Areas. The PUC water distribution system is located within the Otonabee-Peterborough Source Protection Area where the Trent Source Protection Plan applies. The Trent Source Protection Plan (The Plan) was developed under the *Clean Water Act, 2006* and came into effect January 1, 2015. The Plan contains policies that direct local efforts to protect the sources of water for municipal water supply systems. The Plan delineates areas around vulnerable municipal drinking water sources that are most vulnerable to contamination and assign scores for these areas. These vulnerable areas are:

- Wellhead protection areas (WHPA) – area delineated based on the length of time it takes for water to move from the ground surface, underground to the well.
- Intake protection zones (IPZ) – area on the water and land surrounding a municipal surface water intake. The size of each zone is determined by how quickly water flows to the intake, in hours.

Relevance to Study: The city-wide study area transects the following vulnerable areas identified under the *Clean Water Act, 2006*:

- Intake Protection Zone (IPZ)
- Significant Groundwater Recharge Area (SGRA)
- Highly Vulnerable Aquifers (HVA)

Policies from the noted plan apply where activities present significant threats to a municipal drinking water source in the delineated IPZ as shown in **Figure 2-1**.



Policy Applicability Map

Trent Assessment Report Map Reference: 4-8

Figure 2-1: Surface Water System (Trent Conservation Coalition Source Protection Region; Trent Assessment Report (Appendix 1))

2.5 Integration with City Development Plan/Pressure Zones and Future Development Areas

Section 5 summarizes the near and long term draft plan status considering pressure zones, estimated build out and water consumption demands.

3. Peterborough Water Supply and Distribution System – Key Components

3.1 Peterborough Water Treatment Plant

3.1.1 Raw Water Supply

3.1.1.1 Source Water Quantity

The Peterborough Water Treatment Plant (WTP), as identified in **Figure 1-4** and **Appendix B (Figure 1-02)**, receives its water from the Otonabee River. Otonabee River is a major natural waterway that is part of the 386 km Trent-Severn Waterway which connects Lake Ontario at Trenton to the Georgina Bay and Lake Huron. A 22 m long, 720 mm diameter twin cast iron raw water intake pipe withdraws raw water from the river. The intake capacity of the plant is 104,000 m³/day.

The Peterborough Surface Water System is 1 of 53 municipal residential drinking water systems in the Trent Conservation Coalition Source Protection Region and falls within the Otonabee-Peterborough Source Protection Area. The Trent Source Protection Plan has been in effect since January 1, 2015 and is in full compliance with the *Clean Water Act, 2006*. The Plan contains policies that direct local efforts to protect the sources of water for municipal water supply systems.

3.1.1.2 Potential Effects of Climate Change

Potential effects of Climate Change on the source water supply for the City of Peterborough include, but are not limited to:

- Source water availability:
 - Source water quantity – i.e. changes in temperature and precipitation patterns may impact the level of water in the Otonabee River.
 - Energy required to deliver water to customers – i.e. changes in cost of energy may impact the cost of treatment and pumping of water through water distribution system.
- Source water quality:
 - Runoff from agricultural lands – i.e. changes in precipitation patterns and potential for increased runoff may increase the amount of nutrients, pesticides, herbicides and other agricultural-use chemicals into the Otonabee River.
 - Stormwater runoff – i.e. potential for increased runoff from municipal lands may increase the amount of heavy metals, and other anthropogenic pollutants into the Otonabee River.
- Flooding:
 - Potential for flooding where facilities are inside or close to 100 year flood hazard.
- Freezing temperature:
 - Impact on intake – frazil ice.

3.1.2 WTP

The Peterborough WTP receives its water from the Otonabee River. The water treatment process for the Peterborough WTP consists of the following components identified in **Table 3-1** and shown in **Appendix B**.

Table 3-1: Peterborough Water Treatment Plant – Water Treatment Process

Component	Description
Intake Pipe	<ul style="list-style-type: none"> ▪ 22m, 760mm diameter twin cast iron raw water intake pipe located at the eastern section of the WTP. Intake capacity of the plant is 104,000m³/day
Raw Water Screens	<ul style="list-style-type: none"> ▪ Two (2) sets of three (3) stationary coarse mesh screens
Low Lift Pumping Station	<ul style="list-style-type: none"> ▪ Firm capacity of 1,095 L/s ▪ One (1) wet well with 32 m² capacity ▪ Four (4) vertical turbine low lift pumps with the following rated capacities: <ul style="list-style-type: none"> ▪ 131.5 L/s at 21.3 Total Dynamic Head (TDH) ▪ 438.1 L/s at 18.3 TDH ▪ 525.75 L/s at 18.9 TDH ▪ 613.4 L/s at 18.9 TDH
Flash Mixer	<ul style="list-style-type: none"> ▪ Two (2) of 900 mm diameter flash mixers (duty, standby)
Flocculator	<ul style="list-style-type: none"> ▪ One (1) flocculation system of four (4) tanks with total rated capacity of 50,000 m³/day each ▪ One (1) flocculation system of two (2) tanks with total rated capacity of 54,000 m³/day each
Sedimentation basins	<ul style="list-style-type: none"> ▪ One (1) sedimentation system with total rated capacity of 50,000 m³/day ▪ One (1) sedimentation system with total rated capacity of 54,000 m³/day
Filters	<ul style="list-style-type: none"> ▪ Two (2) sets of filters: <ul style="list-style-type: none"> ▪ Nine (9) small filters with combined capacity of 50,000 m³ <ul style="list-style-type: none"> - Six (6) dual media (anthracite/sand) gravity filters - Three (3) granulated activated carbon (GAC) gravity filters ▪ Two (2) large filters with combined capacity of 51,000 m³ <ul style="list-style-type: none"> - Two (2) dual media gravity filters
Clearwell	<ul style="list-style-type: none"> ▪ Three (3) Clearwells: <ul style="list-style-type: none"> ▪ Clearwell No.1 receives water from Filters 1 through 9 and has volume of 600 m³ ▪ Clearwell No. 2 receives water from Clearwell No.3 and has capacity of 900 m³ ▪ Clearwell No. 3 receives spill over water from chlorine contact chamber and has capacity of 6,100 m³
Chlorine Contact Chamber	<ul style="list-style-type: none"> ▪ Total capacity of the chlorine contact chamber is 5,000 m³

Component	Description
High Lift Pumping Station	<ul style="list-style-type: none"> ▪ Contains five (5) centrifugal pumps dedicated to Zone 1 distribution system: <ul style="list-style-type: none"> ▪ Three (3) pumps are equipped with water driven engines: <ul style="list-style-type: none"> - 205.3L/s at 74.7m TDH - 205.3 L/s at 74.7m TDH - 245 L/s at 74.7m TDH ▪ Two (2) pumps are driven by electric motors: <ul style="list-style-type: none"> - 265 L/s at 74.7m TDH - 378 L/s at 74.8m TDH ▪ Contains three (3) vertical turbine pumps dedicated to Zone 2 distribution system: <ul style="list-style-type: none"> ▪ 210.6 L/s at 79m TDH ▪ 262.7 L/s at 79m TDH ▪ 157.4 L/s at 79m TDH
Disinfection System	<ul style="list-style-type: none"> ▪ Consists of chlorine gas system and chlorinators
Chemical Systems	<ul style="list-style-type: none"> ▪ Coagulant: <ul style="list-style-type: none"> ▪ Three (3) chemical tanks ▪ Two (2) metering Pumps (duty/standby) ▪ Chlorine Gas System (for primary, secondary & Zebra mussel control): <ul style="list-style-type: none"> ▪ One (1) ton cylinders (auto cylinder switch-over) ▪ Four (4) chlorinators (located in a separate chlorinator room) for disinfection, back-up, post feed & 1 for zebra mussel control ▪ Chlorine gas scrubber ▪ Hydrofluosilicic Acid: <ul style="list-style-type: none"> ▪ One (1) chemical storage tank plus one (1) day tank ▪ One (1) chemical metering pump ▪ One (1) online fluoride analyser ▪ Sodium Silicate: <ul style="list-style-type: none"> ▪ One (1) chemical storage tank ▪ Two (2) metering Pumps (duty/standby)
Standby Power	<ul style="list-style-type: none"> ▪ Diesel generator available for chemical feed systems, process controls and plant lighting ▪ Diesel engine is available for a low lift as well as for a high lift pump

3.2 Pumping Facilities

The pumping stations supply water to the distribution system. The PUC currently operates ten (10) pumping stations as identified in **Figure 3-3** and **Appendix B. Table 3-2** summarizes the pumping station information.

Table 3-2: Pumping Facility Information Summary

Pressure Zone	Name	Municipal Address	Pump #	Capacity	Year Built	Figure # (See Appendix B)
1	Water Street BPS	1230 Water St. N.	Pump 1	10,260 L/min @ 74.7m TDH	1894	Figure 1-03
			Pump 2	10,260 L/min @ 74.7m TDH	1894	
			Pump 3	18,930 L/min @ 74.7m TDH	1894	
			Pump 4	11,832 L/min @ 74.7m TDH	1894	
			Pump 5	12,642 L/min @ 74.7m TDH	1894	

Pressure Zone	Name	Municipal Address	Pump #	Capacity	Year Built	Figure # (See Appendix B)
1B	Scollard BPS	1370 Scollard Dr.	Pump 1	230 L/min @ 14m TDH	1996	Figure 1-04
			Pump 2	580 L/min @ 14m TDH	1996	
2	Water Treatment Plant	1230 Water St. N.	Pump 1	7,884 L/min @ 79.3m TDH	1921	Figure 1-02
			Pump 2	15,270 L/min @ 79.3m TDH	1921	
			Pump 3	10,518 L/min @ 79.3m TDH	1921	
2	Clonsilla Reservoir BPS	775 Sherbrooke St.	Pump 1	6314 L/min @ 41.1m TDH	1965	Figure 1-11
			Pump 2	6314 L/min @ 41.1m TDH	1965	
			Pump 3	3157 L/min @ 41.1m TDH	1965	
3N	Chemong BPS	1110 Chemong Rd.	Pump 1	5,683 L/min @ 42.6m TDH	1981	Figure 1-06
			Pump 2	2,273 L/min @ 36.6m TDH	1981	
			Pump 3	1,137 L/min @ 33.5m TDH	1981	
3N	Cumberland BPS	717 Cumberland Ave.	Pump 1	3,000 L/min @ 40m TDH	2008	Figure 1-01
			Pump 2	3,000 L/min @ 40m TDH	2008	
			Pump 3	7,500 L/min @ 37.5m TDH	2008	
3N	Fairmount BPS	1535 Fairmount Blvd.	Pump 1	3,785 L/min @ 38.1m TDH	1997	Figure 1-08
			Pump 2	5,678 L/min @ 38.1m TDH	1997	
			Pump 3	5,678 L/min @ 38.1m TDH	1997	
3W	Greencrest BPS	1221 Sherbrooke St. W.	Pump 1	3,600 L/min @ 40.0m TDH	2017	Figure 1-10
			Pump 2	3,600 L/min @ 40.0m TDH	2017	
3W	Lansdowne BPS	1360 Lansdowne St. W.	Pump 1	859.3 L/min @ 60.9m TDH	1974	Figure 1-13
			Pump 2	1,703 L/min @ 65.8m TDH	1974	

3.3 Storage Facilities

The water storage facilities provide emergency water supply and help regulate pressure in the water distribution system. The PUC currently operates five (5) storage facilities consisting of either elevated tanks or reservoirs, as identified in **Figure 3-3** and **Appendix B. Table 3-3** summarizes the water storage facilities information for the PUC.

Table 3-3: Storage Facilities Information Summary

Pressure Zone	Storage Facility Name	Municipal Address	Capacity (ML)	Ground Elevation (m)	Levels (m)		Year Built	Figure # (See Appendix B)
					LWL	TWL		
1	Clonsilla Avenue Reservoir	775 Sherbrooke St.	18.18	208.8	209.1	214.6	1965	Figure 1-11
1	High Street Elevated Tank	1170 High St.	4.50	224.0	245.2	252.8	1957	Figure 1-12
2	Towerhill Reservoir	679 Towerhill Rd.	22.73	281.7	282.2	287.7	Cell 1 – 1971 Cell 2 – 2001	Figure 1-07
3N	Milroy Elevated Tank	280 Milroy Dr.	0.45	275.3	311.8	317.0	1987	Figure 1-05

Pressure Zone	Storage Facility Name	Municipal Address	Capacity (ML)	Ground Elevation (m)	Levels (m)		Year Built	Figure # (See Appendix B)
					LWL	TWL		
3W	Sherbrooke Street Elevated Tank (ET)	1560 Sherbrooke St.	2.27	304	305.2	317.0	1972	Figure 1-09

3.4 Water Distribution Network

The water distribution network consists of watermains that connect the source, WTP, pumping stations, water storage facilities, and PUC customers. There are approximately 461 km of watermain in the PUC water distribution system. **Figure 3-1** and **Figure 3-2** characterize the Peterborough water distribution network by watermain material type and age of the watermains.

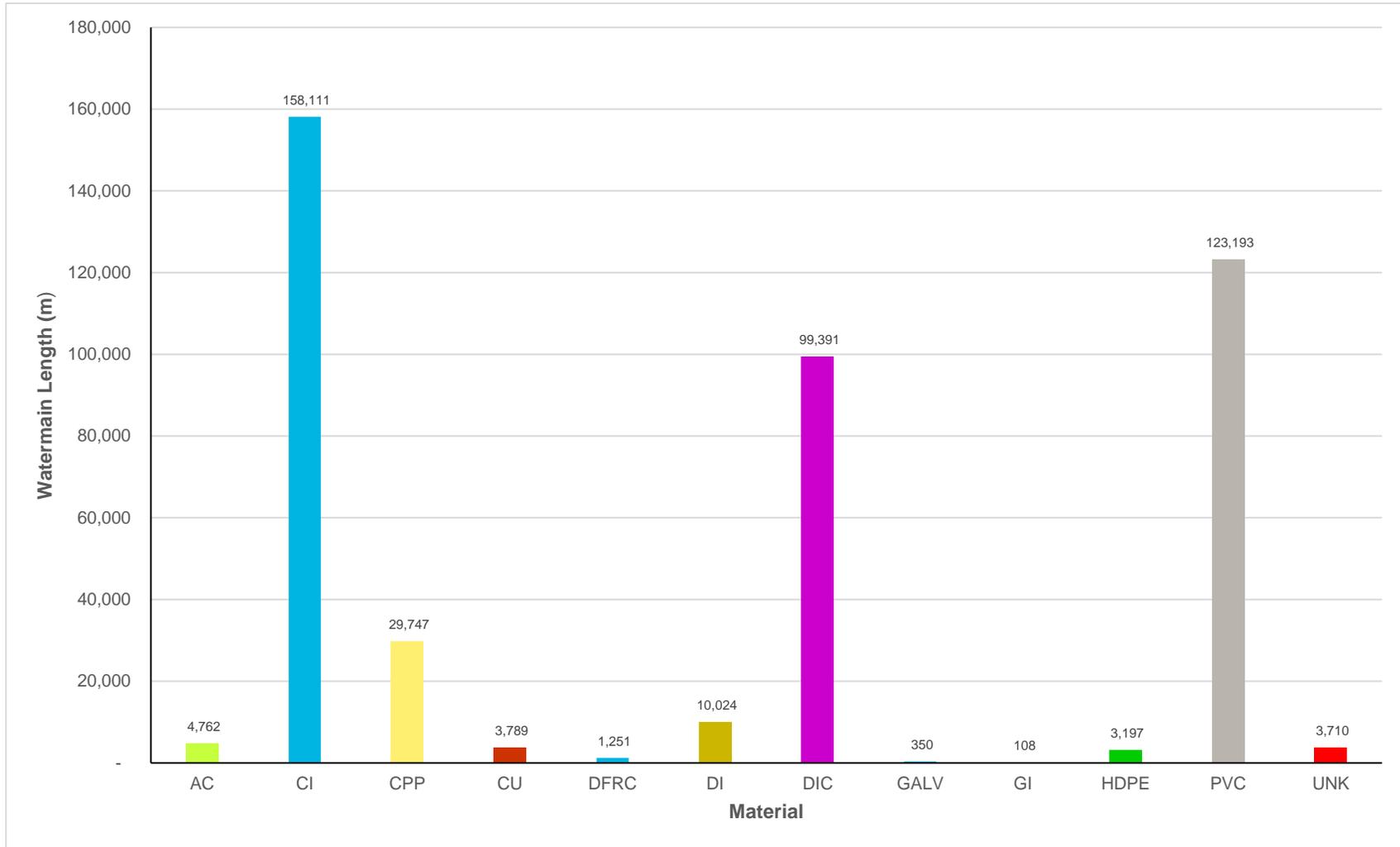


Figure 3-1: Distribution of Watermain Material Type by Watermain Length³

³ The source of the information for this figure is data provided by the PUC.

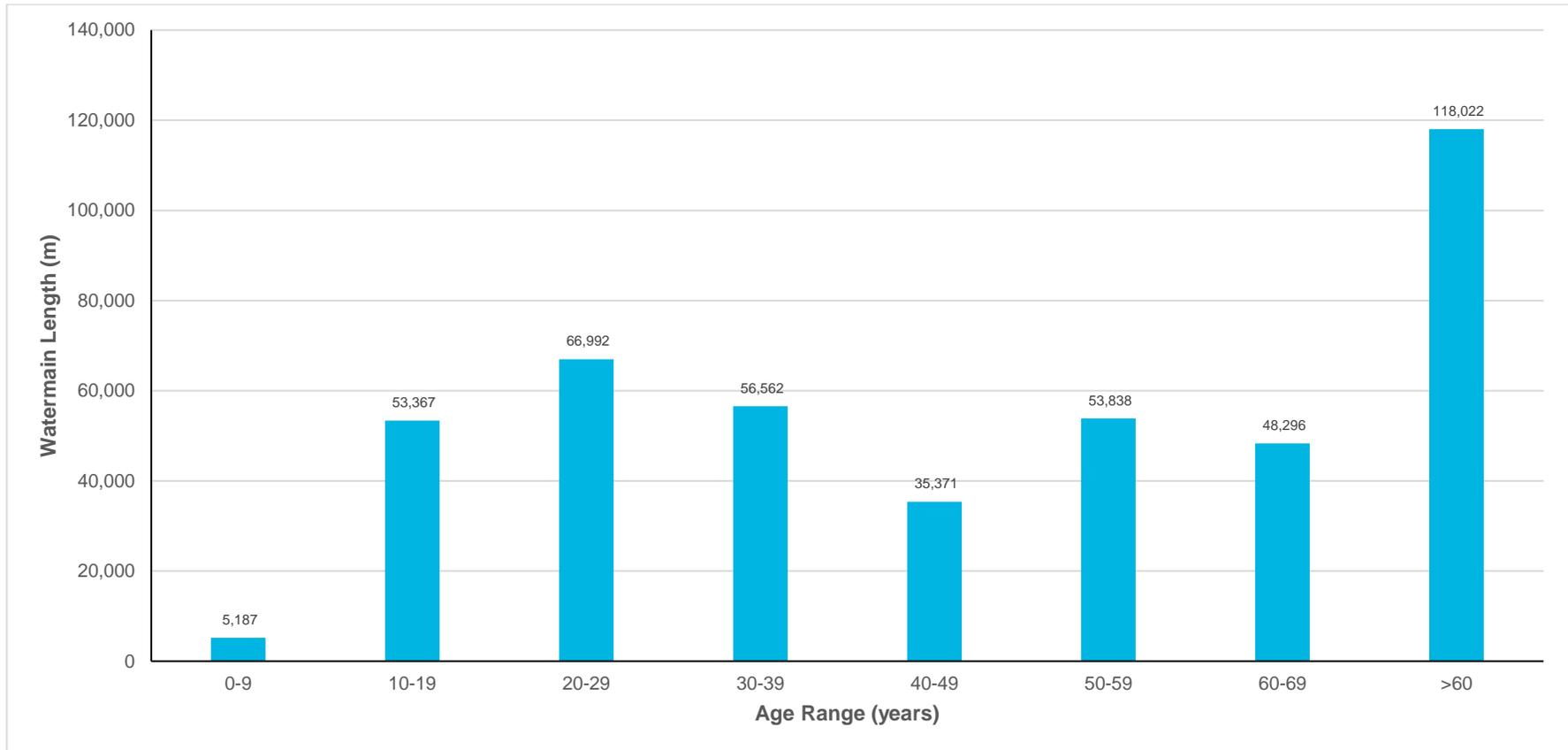
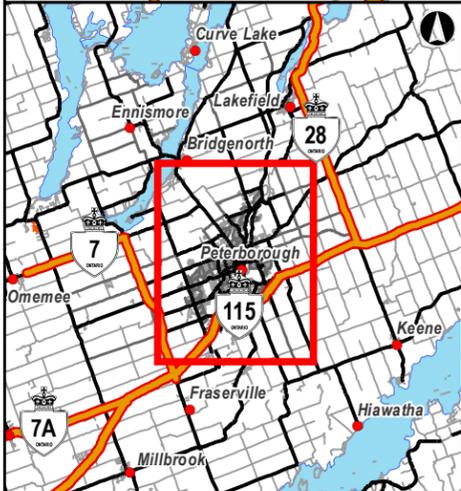
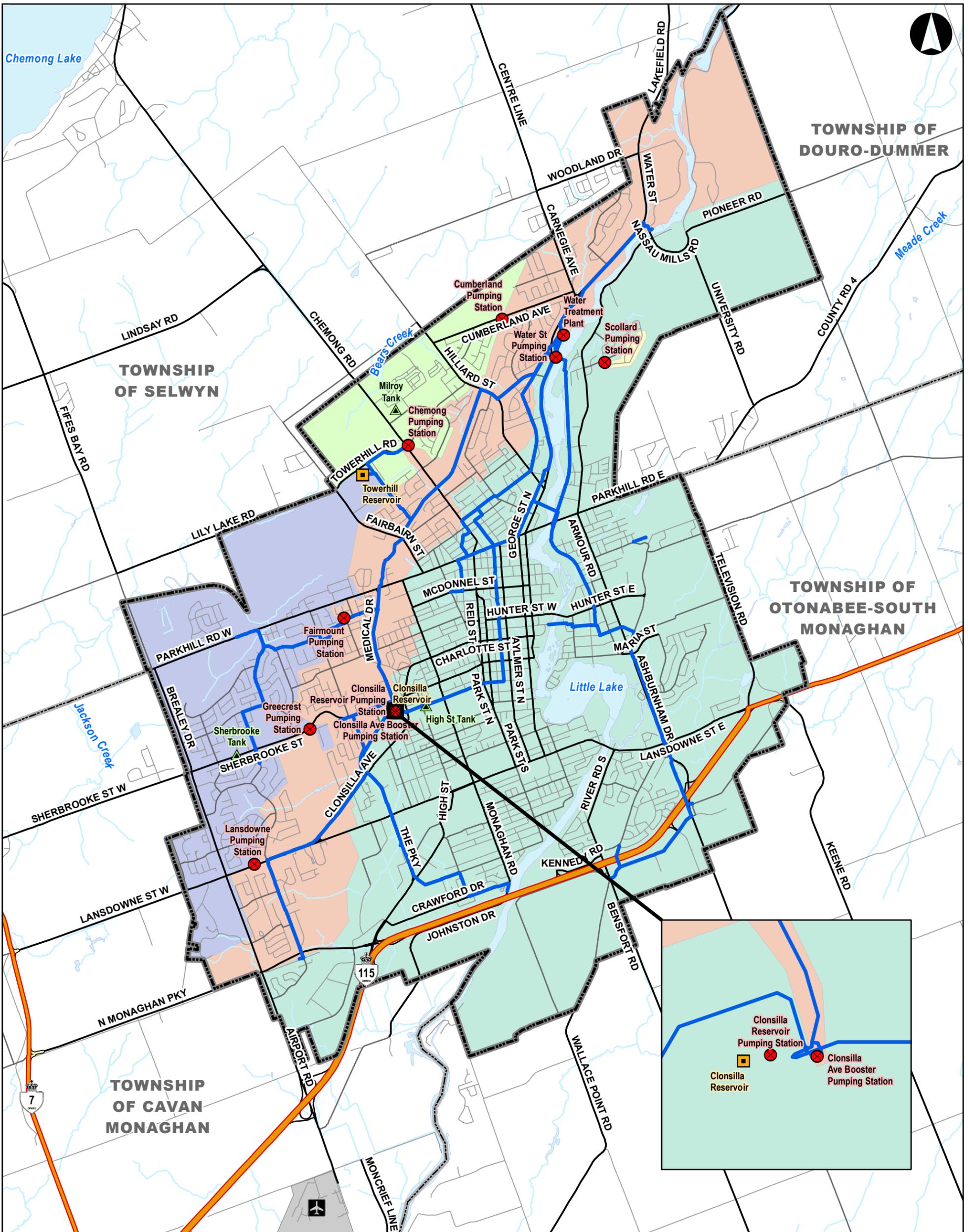


Figure 3-2: Distribution of Watermain Age by Watermain Length⁴

⁴ The source of the information for this figure is data obtained from the Preliminary Water Servicing Strategy Review Technical Memorandum.



Legend

- Pump
- Reservoir
- Tank
- Watermain (>400 mm)
- Freeway
- Highway
- Major Road
- Ramp
- Collector Road
- Local Road
- Service Road
- Watercourse
- Waterbody
- Peterborough
- City of Peterborough
- Municipal Boundary

Pressure Zone

- 1
- 1B
- 2
- 3N
- 3W

Peterborough Utilities Group Services Corp.
Water Utility Master Plan

Peterborough Water Supply and Distribution System –
Key Components

0 0.5 1 2 3
Kilometers

Sep 2019 1:48,000
* when printed 11"x17"

P#: 60566558 V#: 01

AECOM **Figure: 3-3**

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4. Phase 1: Problem/Opportunity Statement

Phase 1 of the five-phase Municipal Class Environment Assessment (MCEA) planning process requires the proponent of an undertaking (i.e., the PUC) to document factors leading to the conclusion that the proposed improvement is needed, and to develop a clear statement of the identified problems or opportunities to be addressed. The Problem/Opportunity Statement is the first phase in undertaking a MCEA study and assists in establishing the study's scope.

The following points were considered in the development of the Problem/Opportunity Statement for the Master Plan:

- The City of Peterborough's water system is operated by the PUC and provides safe drinking water to residents, businesses and industry within the City of Peterborough.
- The Peterborough water system currently serves approximately 81,000 people within the City of Peterborough and two (2) small developments in separate Municipalities; approximately 550 people in the Township of Township of Selwyn called "Woodland Acres" and approximately 158 people in the Township of Otonabee-South Monaghan called "Burnham Meadows".
- The PUC also provides municipal water to the City's Municipal Airport located in the Township of Cavan Monaghan.
- With the future extension of Highway 407 to Highway 115, significant growth and development over the near and long term is expected to occur within the City's approved urban boundary.
- The Growth Plan for the Greater Golden Horseshoe (2019) sets out the planning framework under which municipalities (including the City of Peterborough) are expected to manage their local growth and development. The Growth Plan sets specific population and employment forecasts for upper tier municipalities and also prescribes density targets for intensification and Greenfield development. Municipalities are expected to review their current plans with respect to established growth projections and planning policies.
- Peterborough is one of 25 designated Urban Growth Centres in the Provinces' Growth Plan (2019), uniquely situated as the eastern-most City beyond the protected Greenbelt Area.
- Pursuant to Policy 1.1.1, the Provincial Policy Statement (PPS) requires that municipalities promote the following: efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term, as well as cost effective development standards to minimize land consumption and servicing costs. In order that these objectives may reasonably be achieved, the PPS encourages municipalities to focus growth into defined settlement areas where a full level of water and sewer services are or can reasonably be made available.
- Pursuant to Policy 1.6.1 of the PPS, infrastructure and public service facilities "shall be provided in a coordinated, efficient and cost-effective manner that considers impacts from climate change while accommodating projected needs". Policy 1.6.2 also states that "before consideration is given to developing new infrastructure and public service facilities the use of existing infrastructure and public service facilities should be optimized".
- The Downtown, Central Area, and corridors such as Lansdowne Street, Chemong Road, Clonsilla Avenue, Water Street and Armour Road will be the targeted areas for intensification. Over the next several decades, these areas will contain the highest densities and greatest diversity of land uses. Significant growth, primarily in the form of residential development is also expected to occur in designated growth areas that are generally located around the existing built up area.

- The City of Peterborough is currently completing an update to its Official Plan (OP) that will provide the vision and direction for the growth and development of the City over the next several decades. The update is being supported by a growth management strategy.

Considering the expected and prescribed growth in the City of Peterborough as outline above, the following Problem and Opportunity Statement has been prescribed:

Problem: Significant near and long term growth is expected in the City of Peterborough. As such, there is a need for improving water production/supply and servicing (including water system pressure) in a sustainable manner that can be logically phased. Additional infrastructure (e.g. transmission watermains and storage facilities) must be in place in a timely and orderly manner to service approved growth. A detailed cost phasing and implementation plan is required to allow the PUC to develop a capital works program and budget.

Opportunity: To develop a water utility-infrastructure master plan or “road map” that will support future capital works planning and funding opportunities and meet the needs of existing and future water customers.

5. Assessment of Existing System

The Peterborough Utilities Water Master Plan Update assessed the existing system through a review of pumping capacity, and elevated tank/reservoir storage capacity including backup pumping capacity, and pipe capacity for the entire modelled water distribution network.

5.1 Water Consumption Demand Updates

Water consumption demand allocation is an important step in the assessment of the water distribution system using the hydraulic model. The 2016 City of Peterborough population and employment information was updated using the GIS Traffic Analysis Zone (TAZ) layer and grouped into pressure zones using the Peterborough Water Distribution System Pressure Zone Boundary GIS layer. The results of this spatial analysis are summarized in **Table 5-1**. It is evident that the majority of existing water consumption demand should be found in Zone 1, which corresponds to high proportion of population and employment numbers.

Table 5-1: 2016 Population and Job Data by Pressure Zone

Zone	Population		Employment	
	Census	Distribution	Employment	Distribution
1	47,730	57%	36,201	75%
2	19,198	23%	8,440	18%
1B	573	1%	28	0%
3N	3,198	4%	808	2%
3W	12,720	15%	2,525	5%
Total	83,419	100%	48,001	100%

After discussion with the PUC, the future (2041 Average Daily Demand (ADD) Scenario) demands were updated based on the City of Peterborough Subdivision Activity dated November 2018 (**Table 1-1** and **Figure 1-3**). The Subdivision Activity document provides a number of anticipated low, medium and high density residential units. The number of units was converted into an estimated population based on the occupancy rates in **Table 5-2**.

Table 5-2: Assumed Occupancy Rates

Land Use Type	Occupancy Rate (persons per unit or ppu)
Low Density Residential	3.5
Medium Density Residential	2.5
High Density Residential	1.7

The employment numbers for the commercial development at Cleantech Commons (Zone 2) were assumed based on the MECP Design Guidelines for Drinking-Water Systems. An average industrial land-use type water consumption figure of 45 m³ per day per hectare was used to estimate demand for this development.

It was assumed that the future consumption rate is 350 l/s (liters per second) and the existing consumption rate is 167 l/s.

The future water demand for the proposed subdivision development is presented in **Table 5-3** and the overall population and employment growth in Peterborough by 2041 is presented in **Table 5-4**. The existing and projected water consumption average day demand is summarized in **Table 5-5**.

Table 5-3: Estimated Water Consumption by Subdivision – 2041 Build Out Scenario

Key Map # (See Figure 1-3)	Low Density Units	Medium Density Units	High Density Units	Commercial Land (ha)	Total Units	Zone	Timeline for 100% Build Out	Population Equivalent	Demand (l/s)
4	360	191	0	-	551	3W	< 10 Years	1,738	6.03
12	41	0	0	-	41	1	< 15 Years	144	0.50
13	92	222	0	-	314	1	> 15 Years	877	3.05
14	409	135	0	-	544	1	> 15 Years	1,769	6.14
3	857	441	442	-	1740	3W	> 15 Years	4,853	16.85
8	-	-	-	19.39	-	-	< 15 Years	2,266	10.10
10A	501	56	150	-	707	1	< 15 Years	2,149	7.46
7	35	0	0	-	35	2	< 5 Years	123	0.43
2	342	168	0	-	510	3W	< 5 Years	1,617	5.61
6A	233	0	91	-	324	3N	< 10 Years	970	3.37
6B	70	143	0	-	213	3N	< 10 Years	603	2.09
1	163	40	0	-	203	3W	> 15 Years	671	2.33
9	41	89	0	-	130	1	> 15 Years	366	1.27
10B	-	-	-	-	0	1	> 15 Years	-	0.00
5	179	164	0	-	343	3W	> 15 Years	1,037	3.60
11	58	0	0	-	58	1	< 5 Years	203	0.70
Totals	3381	1649	683		5713		Residential Employment	17,117 2,266	59.43 10.10
Total								19,383	69.53

Table 5-4: Projected Population by Zone

Zone	2016 Population		2041 Population	
	Residential	Employment	Residential	Employment
1	47,730	33,260	53,237	35,526
2	19,198	7,751	19,320	7,751
1B	573	26	573	26
3N	3,198	742	4,771	742
3W	12,720	2,317	22,635	2,317
Total	83,419	44,095	100,536	46,361

Table 5-5: Existing and Projected Water Consumption Average Day Demand

Zone	2016 ADD (L/s)			2041 ADD (L/s)		
	Residential	Employment	Total	Residential	Employment	Total
1	92.3	115.6	207.9	111.4	125.7	237.1
2	37.1	26.9	64.1	37.5	26.9	64.5
1B	1.1	0.1	1.2	1.1	0.1	1.2
3N	6.2	2.6	8.8	11.6	2.6	14.2
3W	24.6	8.1	32.6	59.0	8.1	67.1
Total	161.3	153.3	314.6	220.7	163.4	384.1

5.2 Water Treatment Capacity Evaluation

According to the calculated population and water demand projections, 2041 Maximum Day Demand (MDD) is estimated to be 44.99 ML/d, or 44,987 m³/d. According to the Municipal Drinking Water License, the rated capacity of the Peterborough Drinking Water System is 104,000 m³/d. Comparing existing treatment capacity against future demand, treatment expansion will not be required within the planning horizon.

5.3 Water Treatment Plant Performance

Water quality analyses in recent years show compliances to O Reg. 170/03 based on analyzed water quality parameters. As such, the WTP facility performance appears adequate for future flows; however, the PUC may also consider disinfection by products, such as Trihalomethanes (THMs), are currently within compliance levels. Whether the current compliance levels be reduced to the United States current standard levels in the future, the alternative disinfection methods, such as UV disinfection or Ozone, may be required to be considered to replace or limit the current chlorine disinfections.

5.4 Storage Capacity Requirement

The storage capacity evaluation is based on the MECP storage requirement calculations. Total Treated Water Storage Requirement = A + B + C where: A = Fire Storage; B = Equalization Storage (25% of Maximum Day Demand); and C = Emergency Storage (25% of A + B). The detailed storage capacity calculations can be found in the Water Servicing Strategies Memo (**Appendix C**). The findings of the calculations are summarized below by zone.

5.4.1 Zone 1

Storage for Zone 1 is provided by a floating storage facility, High Street Elevated Tank (ET) (4.5 ML), and an inground storage facility, Clonsilla Reservoir (18.18 ML). The floating storage capacity of 4.5 ML is sufficient to meet the emergency storage requirements for Zone 1 and Zone 1B; fire and equalization storage are provided by pumping from the Clonsilla Reservoir Zone 1 BPS.

5.4.2 Zone 1B

Zone 1B storage requirements are provided by Zone 1 via Scollard Booster Pumping Station (BPS) and the valve connections between Zone 1 and Zone 1B (check valves) since Zone 1B is a direct pressure system and a storage facility is not available. The storage requirements for Zone 1 and Zone 1B are combined for a total storage

requirement of 19.13 ML. The existing storage in Zone 1 is 22.68 ML, which is enough to meet the storage requirement of Zone 1 and Zone 1B.

5.4.3 Zone 2

Zone 2 has enough storage capacity in the Towerhill Reservoir (Zone 2) to meet the equalization, fire and emergency storage requirements.

5.4.4 Zone 3N

The Milroy ET (Zone 3N) has storage capacity of 0.45 ML, which is sufficient to meet the required equalization storage only. Fire flow and emergency supply requirements are provided by the existing Zone 3N pumping facilities that draw water from Zone 2. The available storage capacity from the existing Zone 2 storage is adequate to meet the fire and emergency storage requirements for Zone 3N.

5.4.5 Zone 3W

The Sherbrooke Street ET (Zone 3W) has a storage capacity of 2.27 ML, which is sufficient to meet the required equalization storage only. Fire flow and emergency supply requirements are provided by the existing Zone 3W pumping facilities, which draw water from Zone 2. The available storage capacity from the existing Zone 2 storage is adequate to meet the fire and emergency storage requirements for Zone 3N.

5.4.6 Zone 3N and 3W Combined

Combining Zone 3N and Zone 3W requires a storage capacity of 10.37 ML while the available storage from Sherbrooke Street and Milroy ETs is 2.72 ML, which is sufficient to meet the required equalization storage only. Fire flow and emergency supply requirements are provided by the existing pumping facilities.

5.5 Pump Capacity Requirement

The pump capacity review calculations are detailed in the Water Servicing Strategies Memo (**Appendix C**). The findings of the calculations are summarized below.

5.5.1 Zone 1

Since the available floating storage from the High Street ET can meet the emergency storage requirement only, fire flow and equalization are provided by the existing pumping facilities. The existing Zone 1 firm capacity is sufficient to meet the Maximum Day Demand (MDD) plus Fire Flow (FF) requirements. For meeting the equalization requirements, the existing pumps at the Water House Pumping Station can be operated based on discharge pressure that provides the required pressure modulation in the Zone 1 system.

5.5.2 Zone 1B

The existing firm capacity in the Scollard BPS can meet the Peak Hour Demand (PHD) requirements. Fire flow and emergency supply are provided by Zone 1 via the existing connections between the zones (check valve on Scollard Drive at Cunningham Drive).

5.5.3 Zone 2

Zone 2 required pumping capacity is based on the MDD conditions because Towerhill Reservoir is able to meet the required fire. Clonsilla Reservoir BPS and Water Treatment Plant High Lift PS satisfy the pumping requirements.

5.5.4 Zone 3W

The Fairmount, Greenhill, and Lansdowne BPSs have sufficient combined firm capacity to meet the 2016 MDD + FF condition requirement. Zone 3W would require pump capacity upgrade to meet the 2046 MDD + FF condition requirements.

5.5.5 Zone 3N

Since floating storage from Milroy ET is sufficient to meet the equalization storage requirement, the fire and emergency storage are provided by the existing Zone 3N pumping facilities. The existing Zone 3N firm pumping capacity is sufficient to meet the 2046 MDD + FF condition requirements.

5.5.6 Zone 3N and Zone 3W Combined

It is beneficial to combine the Zone 3N and Zone 3W into a single Zone 3 for hydraulic purposes and eliminate the need to upgrade pump capacity in Zones 3N and 3W. First, combining the zones increase the total storage capacity. Second, combining the zones increases the total pumping capacity for Zone 3. Zone 3 would be serviced by five (5) pumping stations: Chemong BPS, Cumberland BPS, Fairmount BPS, Greenhill BPS, and Lansdowne BPS. The existing pumping capacity is sufficient to meet the required pumping based on the projected population growth.

5.6 Hydraulic Modelling Assessment for Pipe and Pump Capacity

The WaterGEMS hydraulic model was updated with the 2041 demands described in the Water Consumption Demand Updates (**Section 5.1**). The subdivision demands were assigned to the nodes within the model to simulate the increased water consumption based on the 100% build out scenario. Three (3) scenarios were analysed to assess the pipe and pump capacity based on the projected population growth – Average Day Demand (ADD), Maximum Day Demand (MDD) and Peak Hour Demand (PHD). The model was set up to simulate the firm pump capacities at each pumping station. The detailed results of the hydraulic modelling assessment are summarized in the Water Servicing Strategies Memo (**Appendix C**).

The hydraulic modelling analysis concluded that no linear infrastructure upgrades are required based on the projected population growth. However, four (4) areas were identified in the City of Peterborough that may experience low pressure issues based on the projected population growth. These areas are discussed in **Section 5.8**, as well as in the Water Servicing Strategies Memo (**Appendix C**).

5.7 High Street Elevated Tank

A complimentary assignment regarding High Street Elevated Tank (ET) was completed as part of this Master Plan. As part of this assignment, AECOM reviewed the system requirements for continued use of the High Street ET and the condition of the tank, and evaluated alternative options for replacement and reparation of the High Street ET. The High Street ET Review memo and MCEA evaluation can be found in **Appendix D**.

Based on the storage capacity evaluation, Zone 1 has adequate storage capacity to meet the storage requirement criteria with High Street ET temporarily out of service. Storage is provided by the Clonsilla Reservoir with Clonsilla Reservoir BPS and Water Street Pumphouse able to meet the required level of service under emergency. The absence of floating storage can be augmented by commissioning a new ET at Corrigan Hill. The pumping capacity evaluation suggests that both the Water Street Pumphouse and the Clonsilla Reservoir BPS are equipped with backup power and would be able to provide pumped flow during emergencies. The hydraulic modelling assessment of High Street ET taken out of service indicates that there is no significant change in level of service under Average Day, Maximum Day and Peak Hour demand conditions.

AECOM also evaluated options and costs for repair or replacement of the High Street ET. The results of the evaluation (refer to **Appendix D**) indicate that repairing and recoating the High Street ET is the preferred storage option. **Appendix D** also contains the MCEA evaluation that considers all aspects of the environment. The following is recommended for consideration in order to minimize the impact of High Street ET decommissioning for repair:

- High Street ET plays a role in mitigating transient pressures. It is recommended that a transient analysis be carried out to determine whether any additional transient protection equipment may be required prior to taking the High Street ET out of service.
- In addition, due to the absence of a floating storage to regulate pressure with High Street ET out of service, it is understood that the equalization can be provided by the existing pumps. Therefore, it is recommended that prior to decommissioning the High Street ET for repair, the PUC tests the ability of the system to regulate pressure with High Street ET out of service for a significant period of time. The PUC should monitor the pressures within the system as well as transient pressures to verify that the system can provide adequate level of service with the High Street ET out of service.

5.8 Existing System Low Pressure Areas

The results of the hydraulic modelling analysis show that under the 2041 Peak Hour Demand (PHD) Scenario there are four (4) areas within the City of Peterborough that may experience low pressure issues. Areas that fall below 40 psi (pounds per square inch) under PHD are High Street ET, Corrigan Hill area, Airport Road and Wittington Drive, and Towerhill Reservoir area (**Figure 5-1**). The following summarizes the causes of the low pressure issues and provides recommendations to mitigate or verify the low pressure concerns:

- High Street ET area:
 - Low pressure is experience because the simulated tank level is 68%
 - Need to maintain 91% tank level to maintain pressure above 40 psi at the base of the Elevated Tank
- Corrigan Hill area, Airport Road and Wittington Drive area:
 - Low pressure is experienced because of high elevation at the node
 - Confirm elevation and pressure through field testing to verify model results
- Towerhill Reservoir area:
 - Low pressure at the inlet of the reservoir
 - No service connections are expected at the inlet to the reservoir

High Street ET Temporarily Out of Service Analysis PHD Scenario



AECOM

Figure 5-1: Four General Areas of Low Pressure in the 2041 Peak Hour Demand (PHD) Scenario

6. Water System Recommendations – Capital Works Projects

6.1 Zone 3W and 3N Interconnections

Based on the storage and pump capacity assessment, there is insufficient storage in Zone 3N and Zone 3W to meet the MECP storage requirements. However, Zone 2 existing storage capacity is sufficient to cover the storage requirement in the combined Zone 3 with sufficient pumping. The existing pumping stations in Zone 3 have enough pumping capacity to transfer the required fire and emergency storage volume. Therefore, connecting Zone 3W and Zone 3N is recommended.

The PUC already has a proposed design and alignment of the connection between Zone 3N and Zone 3W. A proposed 300 mm diameter PVC watermain follows the Lily Lake Road and connect to Parkhill Road at Chandler Crescent. Based on the available GIS shapefiles, the 300 mm diameter connection would tie into the Chemong BPS discharge at Chemong Road and Towerhill Road.

Out of the five (5) BPS's that could supply Zone 3 only two (2) have standby power. It is assumed that in an emergency the standby power is required only to pump the emergency storage from Zone 2. The emergency pumping capacity requirement is calculated using the MECP design criteria methodology for emergency storage requirement (25% of fire storage and 25% of equalization storage). The Drinking Water Works Permit specifies that the standby pumping at Cumberland BPS and Fairmount BPS is adequate for emergency supply to Zone 3.

The Zone 3W and Zone 3N interconnection is recommended because it maximizes the use of the existing pumping infrastructure, minimizes the overall capital investment, enhances operational flexibility and provides resilience in the event of an emergency.

The following improvements to the current system are required in order to implement this strategy:

- The connection of Zone 3N and Zone 3W via Lily Lake Road and Lily Lake Development. This assumes approximately 4,000 m of 300 mm diameter PVC watermain will be installed within the future road allowance/existing utility corridor. The existing pumping capacity in the combined Zone 3N and Zone 3W is sufficient for the firm pumping capacity requirement, as well as emergency pumping requirements.
- The connection of Zone 3N and Zone 3W requires a trenchless crossing of Jackson Creek from an existing cul-de-sac (watermain) off of Chandler Crescent to the Lily Lake Development. The water crossing is in a utility corridor.

Figure 6-1 shows the current Pressure Zone 3N and Zone 3W boundaries, in addition to the recommended single Pressure Zone 3.

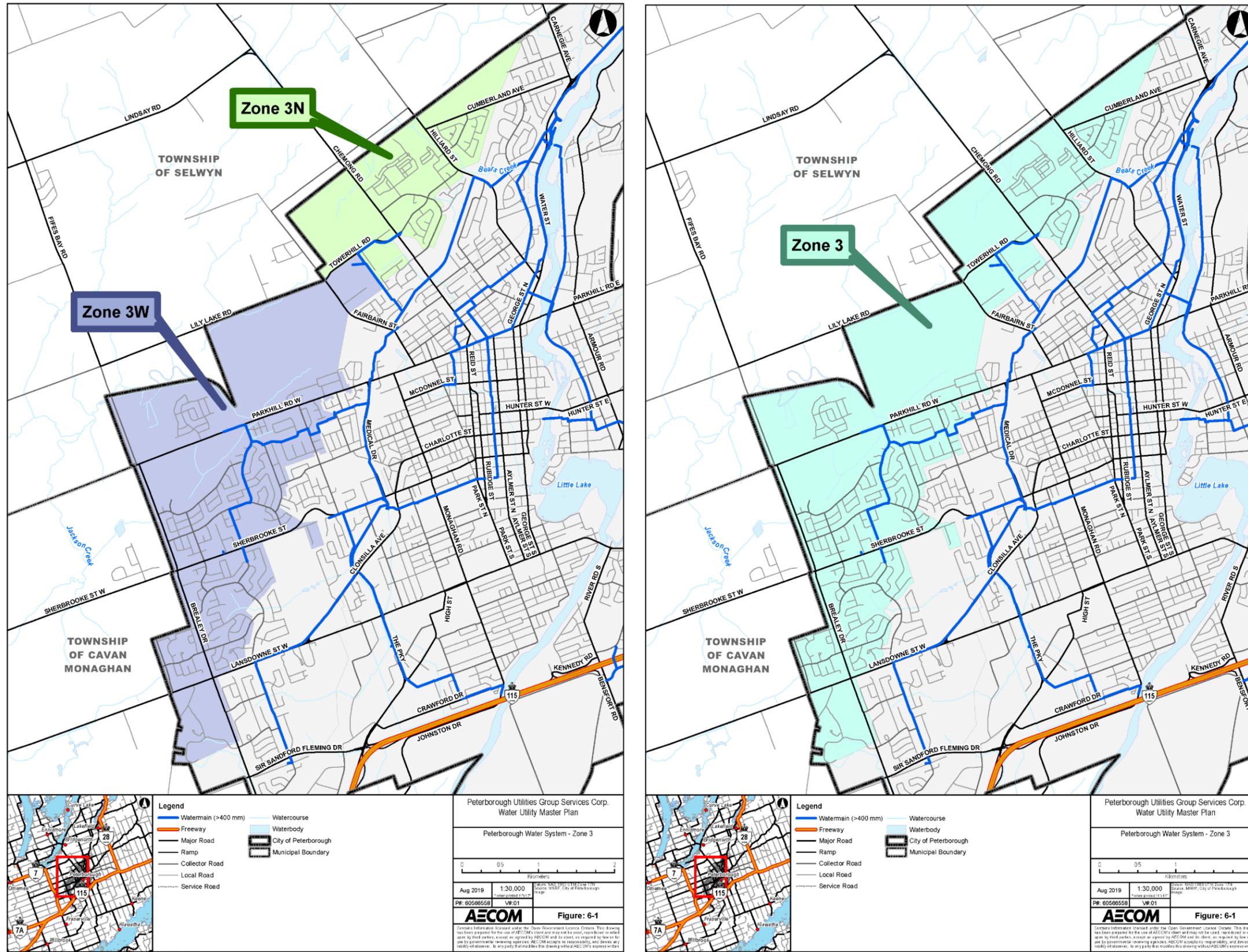


Figure 6-1: Pressure Zone 3 (Zones 3N and 3W)

6.2 Lansdowne BPS and Chemong BPS Decommissioning

During the site inspection and condition assessment of the Zone 3 BPSs, the following was noted about both the Lansdowne BPS and Chemong BPS:

- Both BPSs are considered Confined Space
- The two (2) stations are the oldest out of the Zone 3 pumping stations
- Both have limited capability for a proper pumping station upgrade
- Addition of standby power (temporary or permanent) is unlikely
- Potential for flooding because the stations are in-ground. It is recommended to ultimately decommission both Lansdowne and Chemong BPSs.

Based on these observations, it is recommended that the condition of the Lansdowne BPS and Chemong BPS are closely monitored prior to full upgrade of each station. Lansdowne BPS was commissioned in 1973 and Chemong BPS was commissioned in 1981. Without major capital upgrades, these two (2) stations are approaching the end of their service life. A high level estimate of remaining useful life of each BPS is ten (10) years.

With two (2) BPSs decommissioned, there is a pumping capacity deficit to satisfy the projected future demands in the water distribution system. The existing Zone 3W and Zone 3N pumping stations were evaluated for the possible increase in pumping station capacity based on the existing pipe capacity at the suction and discharge sides of the stations. Based on the condition assessment of each Zone 3W and Zone 3N pumping station, it is recommended that the Cumberland BPS is upgraded to increase its firm capacity by 14.58 MLD to 24.32 MLD. Upgrades to the pumping station can be made within the existing footprint of the station (no building expansion), with consideration given to upgrades to standby power supply at the station. Upgrades to the pipe connections to and from Cumberland Avenue to the Cumberland BPS will need to be upgraded to minimum of 350 mm diameter to maintain acceptable pipe velocities.

6.3 High Street Elevated Tank Rehabilitation

Based on the description of the existing High Street ET condition and cost analysis, as outlined in the High Street Elevated Tank Review memo (**Appendix D**), repair of the High Street ET was identified as the most preferred alternative.

From recent condition inspections, it is concluded that the necessary repair work should be performed soon⁵ in order to avoid further deterioration, and it is recommended that such repair work be performed within the next (2) two to three (3) years. Once repaired, a reasonable service life could be expected from the ET, for up to about 40 years if the necessary periodic maintenance is kept up.

The estimated cost for the repair is approximate \$4.4 Million, saving at least \$4.0 Million over those of the replacement options. As stated, the ET service life could be extended up to 40 years with necessary periodic maintenance.

⁵ The City recently awarded a contract for the design and construction of the ET rehabilitation.

7. MCEA Process – Planning Schedule Confirmation

The MCEA process followed Phases 1 (Problem/Opportunity Statement) and 2 (Alternative Solutions). Through technical analysis it has been confirmed that all recommended projects are Schedule A or A+, as per the MEA MCEA manual, and addressed requirements for the following recommended infrastructure components:

- Water Treatment Plant (WTP)
- Booster Pumping Stations (BPSs)
- Water Storage Facilities
- Distribution System – Watermains

Table 7-1 summarizes the recommended MCEA projects to proceed to implementation in the short term (1-5 years), mid-term (5-10 years) and long term (15-20 years). There are no projects identified as long term at this time.

Table 7-1: Recommended Projects – MCEA Schedule Confirmation

Category	Infrastructure	MCEA Schedule	Future Documentation, Studies or Consultation Opportunities	Implementation
Pressure Zone 1				
Storage Facility	High Street ET: <ul style="list-style-type: none"> ▪ Repair for further 40 years of service life – High Street ET has enough capacity to meet long term growth. 	<ul style="list-style-type: none"> ▪ Schedule A – Normal or emergency operational activities which may include but are not limited to repairs and renovations to treatments and pumping plan equipment, water storage facilities distribution mains and appurtenances. 	<ul style="list-style-type: none"> ▪ PUC is proceeding with design in 2019. ▪ Considering surrounding land uses it is recommended that adjacent land owners (i.e. within 120 m) be notified of the project before construction starts. ▪ The PUC should also consider hosting a public drop in meeting where property owners-residents can review and understand proposed construction, mitigation measures and schedules. 	<ul style="list-style-type: none"> ▪ Short Term (1-5 years)
Pressure Zone 1B				
WTP	Peterborough WTP: <ul style="list-style-type: none"> ▪ None identified. 	<ul style="list-style-type: none"> ▪ Not applicable – No growth related upgrades. 	<ul style="list-style-type: none"> ▪ Not applicable. 	<ul style="list-style-type: none"> ▪ Not applicable
Pressure Zone 2				
--	No identified projects.	<ul style="list-style-type: none"> ▪ Not applicable. 	<ul style="list-style-type: none"> ▪ Not applicable. 	<ul style="list-style-type: none"> ▪ Not applicable
Pressure Zone 3 (3N and 3W Combined)				
Pumping Facility	Chemong BPS: <ul style="list-style-type: none"> ▪ Pressure Zone 3N. ▪ Approaching end of service life within next 10 years without major capital upgrades. ▪ Monitor for retirement and upgrade triggers. 	<ul style="list-style-type: none"> ▪ Schedule A+ – for BPS retirement. ▪ Schedule B – for new BPS or upgrade. 	<ul style="list-style-type: none"> ▪ Requires public notice prior to construction for BPS retirement ▪ Potential future Schedule B EA. 	<ul style="list-style-type: none"> ▪ Mid Term (5-10 Years)

Category	Infrastructure	MCEA Schedule	Future Documentation, Studies or Consultation Opportunities	Implementation
Pumping Facility	<p>Cumberland BPS:</p> <ul style="list-style-type: none"> ▪ Pressure Zone 3N. ▪ Total pumping capacity for Zone 3 can be maintained by increasing pumping capacity at Cumberland BPS. ▪ Upgrades to the BPS can be made within the existing footprint of the station (no building expansion), with consideration given to upgrades to standby power⁶ supply at the station. ▪ Upgrades to the pipe connections to and from Cumberland Ave. to the Cumberland BPS need to be upgraded to minimum of 350mm diameter to maintain acceptable pipe velocities. 	<ul style="list-style-type: none"> ▪ Schedule A – increasing BPS capacity by adding or replacing equipment where new equipment is located in an existing building or structure, and where the existing rated capacity is not exceeded. ▪ Schedule A+ – establish, extend, or enlarge a water distribution system in existing/future road allowance and utility corridor. 	<ul style="list-style-type: none"> ▪ No public notice required for BPS upgrades. ▪ Requires public notice prior to construction for pipe connection upgrades. 	<ul style="list-style-type: none"> ▪ Mid Term (5-10 Years)
Pumping Facility	<p>Lansdowne BPS:</p> <ul style="list-style-type: none"> ▪ Pressure Zone 3W. ▪ Approaching end of service life within next 10 years without major capital upgrades. ▪ Monitor for upgrade triggers. 	<ul style="list-style-type: none"> ▪ Schedule A+ – for BPS retirement. ▪ Schedule B – for new BPS or upgrade. 	<ul style="list-style-type: none"> ▪ Requires public notice prior to construction for BPS retirement. ▪ Potential future Schedule B EA. 	<ul style="list-style-type: none"> ▪ Mid Term (5-10 Years)
Water Distribution Network - Watermains	<p>Distribution System – Watermain:</p> <ul style="list-style-type: none"> ▪ Connect Zones 3N and 3W via Lily Lake Road and Lily Lake Development to form a single Pressure Zone 3. ▪ The above connection requires a trenchless crossing of Jackson Creek from an existing cul-de-sac (watermain) off of Chandler Crescent to the Lily Lake Development. 	<ul style="list-style-type: none"> ▪ Schedule A+ – watermain in existing/future road allowance and utility corridor (Jackson Creek crossing by trenchless methods and is in existing utility corridor). 	<ul style="list-style-type: none"> ▪ Requires public notice prior to construction. 	<ul style="list-style-type: none"> ▪ Short Term (1-5 years)

⁶ Under O.Reg 116/01: Electricity projects, installation or replacement of standby power equipment where new equipment is located in a new building or structure is exempt from the EA Act if the equipment is a generation facility within the meaning of O.Reg 116/01, is constructed for the purpose of providing electricity to the site where the generation facility is located in the event of a failure of a distributor to deliver electricity to the site, and is carried out by Her Majesty in Right of Ontario, a municipality or a public body as defined in the EA Act.

8. Monitoring and Future Master Plan Updates

Given the potential for changes to growth trends and development activity, it is recommended that the PUC review the Master Plan design criteria on an annual basis to ensure that it reflects the local situation. The Master Plan document should also be reviewed on a 5-year basis to make sure it is current and aligned with the City's Official Plan. Future updates should also consider the potential for identifying MCEA Schedule B or C projects and initiating and following the MCEA master plan process as was done for this study.

9. Consultation

9.1 Notices

9.1.1 Notice of Study Commencement

A Notice of Study Commencement introducing the Master Plan and planning process was first issued on June 13, 2018. The notice included contact information for questions, comments or requests to be added to the study's mailing list.

The notice was distributed to all contacts on the agency and stakeholder contact list, posted on the project's website and in two (2) editions of the local newspaper.

Refer to **Appendix E** for a copy of the notice.

9.1.2 Notice of EA Process Closure

A Notice of EA Process Closure was first issued on July 30, 2019. The notice stated that all recommended infrastructure projects are considered Schedule A and A+ in accordance with the MCEA process, thereby allowing the PUC to proceed with implementation.

Schedule A+ projects are pre-approved subject to public notification prior to implementation. The notice indicated that there will be no further consultation, including Public Information Centres or Master Plan documentation review.

The Notice of EA Process Closure was distributed to all contacts on the agency and stakeholder contact list, posted on the project's website and in two (2) editions of the local newspaper.

Refer to **Appendix E** for a copy of the notice.

9.2 Public Correspondence

No comments were received from the public during Phases 1 and 2 of the MCEA process prior to the issuance of Notice of EA Process Closure.

9.3 Agency and Stakeholder Correspondence

The following agencies and stakeholders were identified and circulated on notices for this study:

- City of Peterborough
- Ministry of the Environment, Conservation and Parks (MECP)
- Ministry of Tourism, Culture and Sport (MTCS)
- Ministry of Natural Resources and Forestry (MNRF)
- Otonabee Region Conservation Authority (ORCA)
- Surrounding Municipalities

- Community Organizations
- University/College/School Boards
- Emergency Services

Comments received from agencies and stakeholders are summarized in **Table 9-1** below and in **Appendix E**. All comments were addressed by the study team to the extent possible.

Table 9-1: Agency and Stakeholder Correspondence

Agency/Organization	Date Received	Comments	Response
MECP	July 19, 2018	<ul style="list-style-type: none"> ▪ Provided list of Indigenous Communities. 	<ul style="list-style-type: none"> ▪ All identified Indigenous communities were provided a Notice of Study Commencement letter that included request for potential involvement in the MCEA process. ▪ Identified communities will also be provided Notice of EA Process Closure.
	August 23, 2018	<ul style="list-style-type: none"> ▪ Provided response letter with preliminary considerations/ comments including: <ul style="list-style-type: none"> ▪ MCEA process ▪ MECP technical review issues ▪ Aboriginal Consultation 	<ul style="list-style-type: none"> ▪ Comments noted.
	May 27, 2019	<ul style="list-style-type: none"> ▪ MECP does not need to review supporting studies leading to conclusion all projects are Schedule A or A+. 	<ul style="list-style-type: none"> ▪ Comments noted. Notice of EA Process Closure will be distributed to study's contact list, posted on the PUC website and issued in two (2) separate editions of the local newspaper.
Community Foundation of Greater Peterborough	June 15, 2018	<ul style="list-style-type: none"> ▪ Requested to be removed from the study's contact list. 	<ul style="list-style-type: none"> ▪ Removed from contact list.
Trans-Northern Pipeline Inc.	June 15, 2018	<ul style="list-style-type: none"> ▪ Trans-Northern has no facilities closer than 13km to any point of the entire Peterborough Region 	<ul style="list-style-type: none"> ▪ Removed from contact list.
Fisheries and Oceans Canada (DFO)	June 18, 2018	<ul style="list-style-type: none"> ▪ DFO does not require notifications for administrative purposes. 	<ul style="list-style-type: none"> ▪ Removed from contact list.
Trent University	June 18, 2018	<ul style="list-style-type: none"> ▪ Would like to be involved in EA process. 	<ul style="list-style-type: none"> ▪ Comments noted. ▪ Circulated on Notice of EA Process Closure.

Agency/Organization	Date Received	Comments	Response
Trent University	August 8, 2019 and August 12, 2019	<ul style="list-style-type: none"> ▪ Requested a link to the draft Master Plan Report or a meeting to discuss how the Master Plan proposes to address the University lands and a potential looped system for redundancy. 	<ul style="list-style-type: none"> ▪ PUC addressed.
Peterborough Field Naturalist	June 22, 2018	<ul style="list-style-type: none"> ▪ Requested to be added to the study's contact list. 	<ul style="list-style-type: none"> ▪ Added to contact list. ▪ Circulated on Notice of EA Process Closure.
Transport Canada	June 22, 2018	<ul style="list-style-type: none"> ▪ Response letter requesting to self-assess to determine if project: <ol style="list-style-type: none"> 1. Will interact with a federal property and/or waterway. 2. Will require approval and/or authorization under any Acts administered by Transport Canada. 	<ul style="list-style-type: none"> ▪ Recommended infrastructure does not interact with a federal property and/or waterway nor requires approval and/or authorization under any Acts administered by Transport Canada. ▪ Removed from contact list.
MTCS	July 11, 2018	<ul style="list-style-type: none"> ▪ Response letter indicating MTCS's interest in the Master Plan as it relates to its mandate of conserving Ontario's cultural heritage, which includes: <ul style="list-style-type: none"> ▪ Archaeological resources, including land-based and marine. ▪ Built heritage resources, including bridges and monuments. ▪ Cultural heritage landscapes. 	<ul style="list-style-type: none"> ▪ Comments noted. ▪ Circulated on Notice of EA Process Closure.
City of Peterborough	July 23, 2018	<ul style="list-style-type: none"> ▪ Manager, Infrastructure Planning at the City requested to be added to study's contact list. 	<ul style="list-style-type: none"> ▪ Added to contact list. ▪ Circulated on Notice of EA Process Closure.

In addition to the above correspondence, the study team met with the City of Peterborough on November 1, 2018 to provide an overview the study and discuss City residential and employment forecasts and subdivision activity.

9.4 Indigenous Communities Correspondence

The following Indigenous communities and organizations were identified and circulated the notices for this study:

- Alderville First Nation
- Chippewas of Georgina Island

- The Métis Nation of Ontario Peterborough and District Wapiti Métis
- Curve Lake First Nation
- Mississaugas of Scugog Island First Nation
- Hiawatha First Nation
- Beausoleil First Nation
- Kawartha Nishnawbe First Nation
- Chippewas of Rama First Nation
- Williams Treaty First Nations
- Métis Nation of Ontario
- Mohawks of the Bay of Quinte

Correspondence received from Indigenous communities is presented in **Table 9-2** and **Appendix E**.

Table 9-2: Indigenous Communities Correspondence

Indigenous Community	Date Received	Comments	Response
Curve Lake First Nation	June 18, 2018	<ul style="list-style-type: none"> ▪ Provided updated contact information for Chief Phyllis Williams and consultation staff. 	<ul style="list-style-type: none"> ▪ Contact list updated.
	September 11, 2018	<ul style="list-style-type: none"> ▪ Provided response letter outlining interest in the MCEA and Curve Lake First Nation's Consultation and Accommodation Standards with suggested Level 2 Framework. ▪ Noted that the study area is situated within the Traditional Territory of Curve Lake First Nation, is incorporated within the Williams Treaties Territory, and is the subject of a claim under Canada's Specific Claims Policy. 	<ul style="list-style-type: none"> ▪ Informed you that the study is recommending projects that are deemed Schedule A and A+. ▪ Based on the above, recommended that the Master Plan falls under a Regular Consultation Framework (Level 1 – Little to no Impact) as per Curve Lake First Nation's Consultation and Accommodation Standards. ▪ Circulated on Notice of EA Process Closure.
Chippewas of the Rama First Nation	June 19, 2018	<ul style="list-style-type: none"> ▪ Reviewed Notice of Commencement with Council and forwarded a copy to Karry Sandy McKenzie, Williams Treaties First Nation Process Co-ordinator/Negotiator for necessary action, if required. 	<ul style="list-style-type: none"> ▪ Comments noted. ▪ Circulated on Notice of EA Process Closure.
	August 6, 2019	<ul style="list-style-type: none"> ▪ In response to the Notice of EA Process Closure, Chippewas of Rama First Nation indicated they had no comments at this time. 	<ul style="list-style-type: none"> ▪ Comments noted.

10. Conclusions and Recommendations

10.1 Conclusions

This Municipal Class Environmental Assessment (MCEA) covers the planning process required to ensure that the study and proposed projects meet the requirements of the *Environmental Assessment Act (EAA)*. The preferred strategy is to pump surplus storage from Zone 2 to future Zone 3 growth areas, connect Zone 3 North and Zone 3 West via the Lily Lake subdivision development, and to rehabilitate the High Street Elevated Tank (ET). The MCEA process concluded that all of the proposed projects are considered Schedule A or A+ as per the MEA MCEA manual and as such, a Notice of EA Process Closure was issued in July 2019. Schedule A+ projects are pre-approved subject to notifying the public before construction is to start.

10.2 Recommendations

Considering the above it is recommended that:

- The PUC proceed with the design, tender and construction of the above projects, including public notification prior to construction for the identified Schedule A+ projects.
- The public notice for the rehabilitating the High Street ET is circulated to all property owners surrounding the ET. The notice may also offer an opportunity for a drop in project review meeting.
- The PUC continue to monitor and update this Master Plan as described in **Section 8**.

