



Finance, Administration and Operations Committee

Tuesday, January 16, 2018, 4:30 pm
City Hall, Council Chambers

Committee Members

Councillor J. Fullarton,
Chair
Councillor T. Blanchard
Councillor P. Deery
Councillor J. Earle
Mayor D. Henderson,
Ex-Officio

Areas of Responsibility:

Clerk's Office	CRCA
Environmental Services	Cemetery
Finance Department	Health Unit
Fire Department	Joint Services
Human Resources Dept.	Committee
Operations Department	PLMG
Airport Commission	Police Services Board
Arena Advisory Board	Safe Communities
Brockville Municipal	Coalition
Accessibility Advisory	St. Lawrence Lodge
Committee (BMAAC)	Management Board
	Volunteer Awards

All legal matters
[excepting the purchase
and sale of land]

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AGENDA

Disclosure of Interest

Delegations and Presentations

6 - 53

1. Electric Vehicles
Gord McFarlane

G. McFarlane will provide an overview of the use of electric vehicles at the request of Councillor LeSueur.

Correspondence & Communications

54 - 55

1. Motion to Support the Widening of Highway 401
Town of Prescott

WHEREAS the volume of traffic along Highway 401 through Eastern Ontario is at the point where the current four-lane design is inadequate;

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January 16, 2018

AND WHEREAS the congestion due to the rising number of commercial and regular vehicles is putting the safety of motorists and first responders at risk;

AND WHEREAS since May 2017 there have been 12 fatal crashes on Highway 401 between Trenton and Cornwall that have claimed the lives of 16 people and injured 18 others;

AND WHEREAS these collisions result in prolonged closures of the highway that put a strain on emergency resources and create dangerous conditions on secondary roads not designed for heavy traffic volumes;

AND WHEREAS expanding Highway 401 to six lanes through Eastern Ontario is essential to public safety and supporting the region's economy;

AND WHEREAS in response to the dangerous situation on the highway through Eastern Ontario, the Minister of Transportation stated: "At this time, the ministry does not have plans to widen Highway 401 through this area."

THEREFORE BE IT RESOLVED THAT the Council for the Corporation of the City of Brockville supports expanding Highway 401 through Eastern Ontario to six lanes and that the Ministry of Transportation add the expansion plans to its Southern Highways Program.

AND FURTHER THAT copies of this resolution be sent to the Minister of Transportation, AMO, ROMA and the MPPs representing Eastern Ontario.

Reports from Boards and Committees

Nil.

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Staff Reports

- 56 - 57 1. 2018-006-01
 2018 Municipal Election
 Council Restrictions after Nomination Day

THAT Council receive report 2018-006-01, 2018 Municipal Election, Council Restrictions after Nomination Day for information purposes.

- 58 - 59 2. 2018-007-01
 Provincial-Municipal
 Gas Tax Agreement

THAT Report No. 2018-007-01 dated January 8, 2018 regarding Provincial-Municipal Gas Tax Agreements be received for information.

AND FURTHER THAT the Mayor and Director of Corporate Services be authorized to sign the "Municipal Funding Agreement for the Transfer of Dedicated Gas Tax Funds" on behalf of the City of Brockville.

AND FURTHER THAT staff be authorized to bring forward a by-law to execute the Municipal Funding Agreement between the Association of Municipalities of Ontario (AMO) and the City of Brockville, and all subsequent agreements or amendments with respect to the Dedicated Gas Tax Funds with the Association of Municipalities of Ontario.

- 60 - 73 3. 2018-010-01
 Fire Dispatch Communications
 Service Agreement

THAT Council authorizes the Mayor and Clerk to execute a Fire Dispatch Communication Service Agreement between the City of Brockville and the Corporation of the Town of Prescott for the period of five years commencing on January 1st, 2017 and ending on December 31st, 2021.

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- 74 - 78 4. 2018-009-01
 Ontario Municipal Commuter
 Cycling Program

THAT Council authorize the Mayor and City Manager to enter into a Transfer Payment Agreement with Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation for the Province of Ontario for the Ontario Municipal Commuter Cycling Program.

- 79 - 80 5. 2018-008-01
 Lease of Caboose - Escape Room

THAT the City of Brockville enter into a lease with Ottawa Tasting Tours for the use of the caboose in Armagh S. Price Park as an "Escape Room".

- 81 - 158 6. 2017-122-12
 2016-2017 Fire Master Plan

THAT Council adopt in principle the City of Brockville 2017 Master Fire Plan as presented by the Fire Department Administration team in conjunction and with the assistance of with Consultants Chris Powers and Terry Gervais.

This report was referred from the December 12, 2017 meeting of Council.

- 159 - 264 7. 2018-003-01
 Water & Wastewater Systems
 Quarterly Report (Oct. - Dec. 2017)

THAT Report 2018-003-01 Water & Wastewater Systems Quarterly Report (Oct. - Dec. 2017) be received for information purposes.

New Business - Reports from Members of Council
Nil.

FAO - Consent Agenda

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Adjournment

THAT the Finance, Administration and Operations Committee adjourn its meeting until the next regular meeting scheduled for February 20, 2018.

1



BROCKVILLE
CITY OF THE 1000 ISLANDS

LEADING
The WAY



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ELECTRIC VEHICLE
CHARGING
AVAILABLE HERE



2

Everything you need to know about electric cars

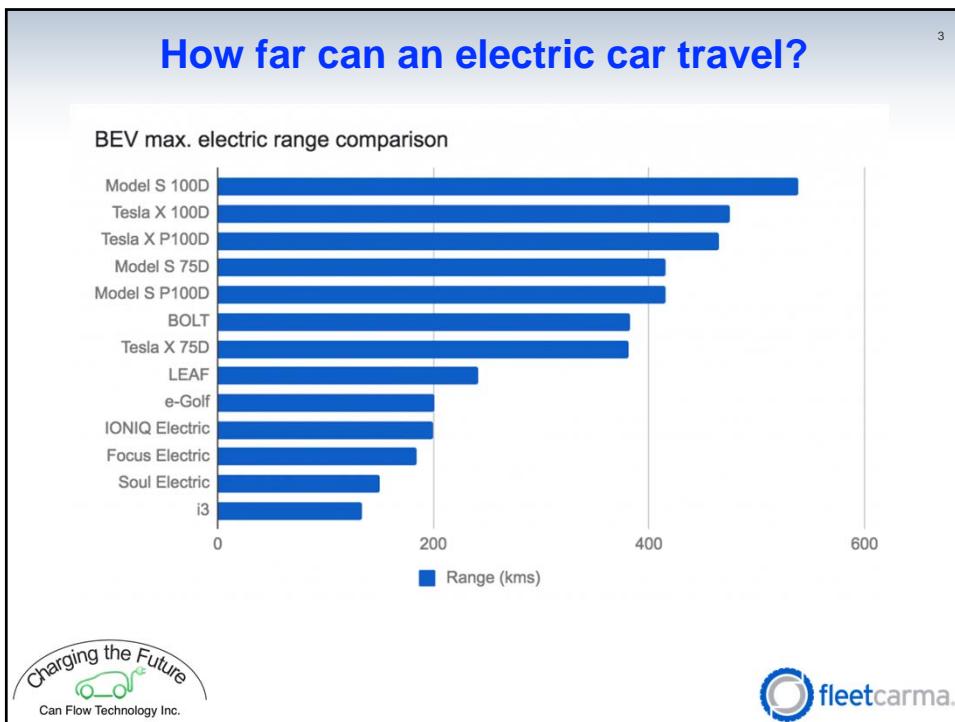


but were afraid to ask.....



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4

Electric Vehicles Currently Available in Canada

Make	Model	MSRP (CDN) ▲	Incentive	Price after rebate
Ford	Focus Electric	\$31,000	\$14,000	\$17,000
Toyota	Prius Prime	\$35,000	\$0	\$35,000
Nissan	LEAF	\$36,000	\$14,000	\$22,000
Kia	Soul Electric	\$36,000	\$14,000	\$22,000
Hyundai	IONIQ Electric	\$36,000	\$14,000	\$22,000
Volkswagen	e-Golf	\$36,000	\$14,000	\$22,000
Ford	Fusion Energi	\$38,000	\$7,730	\$30,270
Chevrolet	VOLT	\$39,000	\$14,000	\$25,000
Kia	Optima PHEV	\$42,000	\$8,460	\$33,540
Chevrolet	BOLT	\$43,000	\$14,000	\$29,000
Mini	Cooper Countryman	\$43,000	\$7,730	\$35,270
Hyundai	Sonata PHEV	\$44,000	\$8,460	\$35,540
Audi	A3 Sportback e-tron	\$46,000	\$8,095	\$37,905
BMW	i3	\$48,000	\$13,000	\$35,000
BMW	330e xDrive	\$52,000	\$7,730	\$44,270
Chrysler	Pacifica PHEV	\$56,000	\$14,000	\$42,000
BMW	i3 REX	\$56,000	\$13,000	\$43,000
BMW	530e xDrive	\$66,900	\$8,460	\$58,440
BMW	X5 xDrive	\$74,000	\$3,000	\$71,000
Mercedes-Benz	GLE 550e	\$83,000	\$3,000	\$80,000
Volvo	XC90 T8 AWD	\$86,000	\$8,825	\$77,175
Cadillac	CT6 PHEV	\$86,000	\$3,000	\$83,000
Porsche	Cayenne SE Hybrid	\$92,000	\$0	\$92,000
Tesla	Model S	\$103,000	\$14,000	\$89,000
Porsche	Panamera SE Hybrid	\$106,000	\$0	\$106,000
BMW	740Le xDrive	\$108,000	\$3,000	\$105,000
Tesla	Model X	\$118,000	\$14,000	\$104,000
Mercedes-Benz	S 550e	\$118,000	\$3,000	\$115,000
BMW	i8	\$145,000	\$3,000	\$142,000
Karma	Revero	\$169,000	\$0	\$169,000

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What are the benefits of driving an electric car? 5

Cheaper to operate

Performing basic calculations, the average electric vehicle can save a driver who drives 24,000 km in a year about \$850 annually on fuel. Keep in mind that these estimates have been made without taking any special charging systems into consideration. This, together with various tax breaks and government subsidies, means that virtually all-electric vehicles start to pay for themselves a long time before they reach the end of their expected lifespans, leading to significant savings over time.

Require less maintenance

Electric cars have fewer moving parts compared to internal combustion engine vehicles. As a result, EVs require less maintenance and have lower maintenance costs. "The electric motor has one moving part, the shaft, which is very reliable and requires little or no maintenance. The controller and charger are electronic devices with no moving parts, and they require little or no maintenance," states [Idaho National Laboratory](#) in their paper comparing gasoline and electric vehicles.



What are the benefits of driving an electric car? 6

Electric vehicles are safer

All passenger vehicles are required to pass the same safety and crash tests, electric cars, however, have a few extra features which may make them safer to ride in. For example, statistics on real-world crash events show that electric vehicles are far less likely to catch fire when compared to fuel vehicles. Compare gas cars – 1 fire to every 20 million miles – to electric vehicles – 1 fire to every 120 million miles driven. It's virtually impossible for a battery-powered car to explode on impact, and because heavy battery packs significantly lower an EV's centre of mass, the car is less likely to roll over. Manufacturers of electric vehicles don't spare any expense on built-in safety systems, which is why EVs regularly exceed all safety standards. In fact, many EVs score higher in crash test safety ratings, Tesla Model X, for example, has a [perfect score](#).

Reduced tailpipe emissions

Battery electric vehicles (BEVs) don't produce any tailpipe emissions compared to the average gasoline car produces over [350 grams of CO2 per mile](#). Cleaner air means less disease in the world, which means less stress on public health systems, hospitals, and so on. In addition, fewer greenhouse gas emissions will save the ozone layer and reduce our carbon footprint. If we can't stop global warming, we can certainly slow down the onset, and EVs are nothing if not a good start.



What are the benefits of driving an electric car?

Easier to use

An often overlooked aspect of owning and operating an EV is just how easily they fit into your life. The ability to charge them at home, at work or at public chargers means you never have to go out of your way to 'refuel'. EV owners can simply plug-in after returning from home and have a fully charged battery the next morning. Fleet vehicles can be charged using smart EV charging systems that offer maximum cost savings, thanks to advanced energy management tools. Residential users can sign up to special programs which [optimize home charging](#) for big savings.

Electric cars are quiet

At 100 km/h, the average interior noise of a car with an internal combustion engine is around 70 dB. Electric vehicles, on the other hand, are almost whisper-quiet. According to a study published by the [National Institute of Environmental Health Sciences \(NIEHS\)](#), "Tens of millions of Americans suffer from a range of adverse health outcomes due to noise exposure, including heart disease and hearing loss." The same study claims that "nearly 100 million people in the United States (about 50% of the population) had annual exposures to traffic noise that was high enough to be harmful to health."



What are the benefits of driving an electric car?

Faster than you think

Despite the allure of high-octane fuel burning muscle cars, new speed records are being claimed by electric vehicles. For example, the Tesla Model S P100D did [0 to 60 mph in 2.28](#) seconds, that's faster than a Bugatti Chiron. Even the most powerful fuel engines are unable to match the instantaneous and constant torque of an electric motor.



Typical Charging Costs

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$3.3\text{kW} \times 3.5\text{hr} \times \$0.065 = \$1.00/\text{day}$ or less
(night)



The Real Cost

10

Paying for it...

People see this
And think \$50



Oh the
Horror!

Reality with EV's is



$20\text{¢}/\text{hr}$
 $\$1/\text{day}$ for $30\text{mi}/\text{day}$



Typical Fuel Costs

11

- 2016 Nissan Leaf S: **\$400** vs. \$1,872 for a gas-powered compact car
- 2016 Chevy Volt: **\$568** vs. \$1,872 for a gas-powered compact car
- 2016 BMW i3: **\$396** vs. \$1,872 for a gas-powered compact car
- 2016 Tesla S (P90D): **\$532** vs. \$2,076 for a gas-powered, full-size car



Maintenance Costs

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Maytag Repairman or EV Serviceman

Standard Internal Combustion Engine (ICE) has >2,000 moving parts

Standard EV Drive Train has 13 moving parts

- NO Oil to change
- NO Transmission fluid to change
- NO Tune up required
- NO Muffler to replace
- Regenerative Brakes last 200,000km+
- Battery, guaranteed for 8 years (GM)
- Tires, we all need.



Who Uses EVs

Police Departments do



NYPD gets 50 new Chevy Volts



LAPD and more than 50 others
are now using Zero Motorcycles



Key Benefits

- EVs produce no tailpipe emissions and have lower lifecycle emissions than gasoline powered vehicles.
- EVs are quiet due to lack of engine noise.
- EVs generally have lower maintenance and fuel costs, reducing the total cost of ownership.
- EVs don't rely on petroleum, and electricity prices are more stable than gasoline prices.
- Charging at home is convenient.
- When combined with a home solar system, "fuel" costs can be completely eliminated.



Myths Busted

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Myth 1: Drivers worry about how long it takes to charge their EV

It doesn't really matter how long it takes to charge an EV. Because every time you get in an EV it usually has a "full tank".

Myth 2: Drivers worry about how far an EV can go on a single charge

The fact that most car trips take place within a small radius – few of us are travelling hundreds of kilometres every day – means that EV range isn't really an issue, day to day.

Myth 3: Drivers worry about replacing the battery

EV batteries are not like those 1980s-era rechargeable AA batteries. Lithium-ion batteries have a much greater capacity and don't have charging "memories" like early rechargeables.

Myth 4: Drivers worry about vehicle maintenance

This is an often overlooked benefit of EVs. Most of the maintenance of our cars and trucks has to do with maintaining the engine and exhaust system. It's all about oil and fluid changes, new filters and gaskets, and replacing catalytic converters.

An EV has none of these parts. Eventually, you'll need to change the brake pads, but many drivers report that doesn't happen for 100,000 or more kilometres down the road. Why? EVs use regenerative braking to slow down, which takes the kinetic energy from the car and converts it to electricity that goes back into the battery. So your brake pads do very little work, and last much longer.



FleetCarma

16

Our mission is to help accelerate the adoption of EVs, and strive to make the ownership experience better.

FleetCarma is an award-winning Cleantech Information and Communications Technology company, with connected vehicle products and services that have been enabling the adoption of plug-in electric vehicles since 2007.

Our clients use our world-class [EV modelling technology](#) to scale their fleet with confidence, our [EV monitoring system](#) to optimize EV fleet deployments or conduct [EV research](#), and our [smart charging system](#) to help manage peak loads and facilitate EV smart grid initiatives.

For utilities, this means engaging key stakeholders to increase EV uptake and running smart charging programs with real-time battery state-of-charge data.

For fleets, this means increasing the productivity of your fleet with GPS tracking and automated odometer reporting, along with running a more efficient maintenance program with automated alerts.

For leasing companies, this means monitoring the EVs after deployment to ensure they're being utilized effectively.

For researchers, this means accessing hard-to-get data for all your vehicles with a plug-and-play solution.

With more than 150 clients and deployments in 23 different countries, we're committed to accelerating the adoption of EVs and ensuring that the ownership experience is a positive one.



When it's gone.....



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THANK
YOU

for

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The WAY

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Viability of Electric Vehicles within the Vancouver Police Department Fleet

by

Daniel Lawrence Wood, B.A.

Greenest City Scholar – Planning, Audit, and Research Section

Vancouver Police Department

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Abstract

Emissions from gas vehicles negatively impact the environmental wellbeing of a city. Green initiatives that aim to reduce greenhouse gas (GHG) emissions by replacing ageing internal combustion engine vehicles (ICEVs) with more environmentally friendly alternatives have been launched in numerous municipalities across Canada. The purpose of this project is to examine the feasibility of replacing the ageing 4-door administrative and detective fleet of Ford Fusions with electric vehicle (EV) alternatives at the Vancouver Police Department (VPD). The fuel efficiency and maintenance cost data of 112 fleet vehicles were compiled and used to construct the total ownership cost (\$6,119,456). The 8-year total cost of ownership (TCO) of a complete 112-vehicle fleet using the proposed Ford Focus EVs is estimated to be significantly less (up to \$1.04 million) than the TCO of the existing ICEVs. Furthermore, an online survey was conducted to determine the VPD detective and administrative employees' perception of this class of vehicle and to investigate whether their operational needs would still be met if they were to use one. A total of 96 participants (n=200) responded to the survey over a three-week period in June. Over 75% of survey respondents indicated that if their trip destination is within 80 kms and either car is available, they would prefer to use an EV over a ICEV. In addition, 79% of respondents believed that the majority of all vehicle trips conducted while on duty fall within the 80 kilometre range of what a fully charged EV is capable of travelling without refuelling. In summary, the fuel efficiency, maintenance cost, and survey response data suggest that it is both financially feasible and operationally possible to replace a proportion of the current ICEVs with similarly equipped EVs at the VPD.

Preface

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Acknowledgements

I offer my sincerest gratitude to my supervisor Mr. Rob Rothwell. Mr. Rothwell's constant encouragement, motivation, and guidance had helped me greatly throughout this project.

In combination with the mentorship of Mr. Rothwell, I am blessed to work with dynamic and intelligent colleagues. Their expertise contributed significantly to my ability to synthesize the most accurate and complete report as possible. Special thanks to the following people for their assistance with completing this report: Dawna Marchall-Cope, June Yamamoto, Simon Demers, Tim Szkopek-Szkopowski, Amy Sidwell, JR Santos, Jennifer Richards, Alison Munroe, and my amazing wife Jayde Wood.

1. Introduction

In 2010, the City of Vancouver's municipal council adopted the long term goals recommended by the Greenest City Action Team (GCAT) and set in motion a series of activities that would transform the way in which the city would achieve its economic and social objectives for the next 10 years ("Greenest City 2020 Action Plan" 7). As a result of this decision, a Vancouver Police Department (VPD) project was approved for funding to investigate how Vancouver could become a world leader in 1) eliminating its dependence on fossil fuels and 2) minimizing the release of GHG emissions from vehicle traffic ("Viability of Electric Vehicles Within the VPD" 1). Specifically, this project aims to explore the possibility of reducing fossil fuel consumption by replacing the Ford Fusion administrative and detective vehicles at the VPD with EV alternatives. Over the course of 4 months, data were gathered and analyzed to determine if EVs could be used to replace the existing Ford Fusion vehicles without suffering from any reduction in service efficacy. In other words, could the same organizational requirements be met when using a vehicle that consumes electricity for fuel rather than using a vehicle that consumes gasoline? This project concludes that it is both financially and operationally possible to replace ICEVs with EVs.

Section one of this report describes the history of EVs, their current implementation at the municipal level in various jurisdictions across North America, and provides an analysis of the different psychological and environmental impacts that this type of vehicle can have. Section two of this report describes the methodology taken to determine the feasibility of replacing ICEVs with EVs at the VPD and section three finishes with the results, limitations, conclusion and recommendations.

1.1 Current Vehicles Used by the Vancouver Police Department

Constables and sergeants currently use fleet vehicles for a variety of purposes including but not limited to investigation, surveillance, traffic stops, meetings, person interviews, and couriering. However, many of these ICEVs are ageing and scheduled to be retired. Based on data provided by the City of Vancouver's Department of Engineering, 92% of the detective and administrative vehicle fleet is comprised of 4-door, 4-cylinder Ford Fusions with a production year between 2008 and 2013 with the remaining 8% comprised of 4-door, 4 cylinder Ford Focuses with a production year between 2001 and 2006. All vehicles except one are equipped with a standard set of emergency lights and a majority of the vehicles are used on a daily basis. On average, the vehicle keys are usually returned to the department key desk before 5pm on same day. There are, however, some outliers. For example, there may be an instance where a vehicle may need to be driven far outside of the city, accumulating more than 200 kms in a single trip, with the key not being returned for days.

Based on internal department documents, in 2011 the VPD's fleet of Crown Victoria police cars travelled a cumulative distance of 3.4 million kms and had consumed a staggering 850,000 litres of gasoline. Vehicle emissions that are produced by the day-to-day operations of the VPD therefore contribute a substantial amount of pollutants such as sulphur dioxide (SO_2) and carbon dioxide (CO_2) into the environment. A simple reduction in a proportion of these emissions could result in improved air quality and thus contribute to the City of Vancouver's Greenest City 2020 Action Plan goal #9 of breathing the cleanest air of any major city in the world.

1.2 Introduction to Electric Vehicles

Several decades ago, the idea of using electricity to power a motor vehicle was something that could only be seen in science fiction movies. Interestingly, EVs were actually conceptualized before the first ICEVs (Dings 9). In the late 19th century, France and Britain were the first to see the widespread development of these vehicles, and America followed with its first large-scale commercial fleet of New York Taxis in 1897 (Dings 8). The production of EVs began to decline shortly after 1912 due to several factors, such as improved road networks requiring vehicles capable of longer-range transportation, the advent of the electric car starter thus replacing the hand crank, the discovery of cheaply available crude oil in Texas as an energy source, and Henry Ford's mass production of ICEVs for under \$1000 (Dings 9). The reemergence of an EV sector did not occur until the OPEC oil embargo of the 1970's and has continued with external pushes like stricter air pollution laws and climate change (Dings 10).

Today, electric engines are used in a wide variety of applications, ranging from aeronautics to personal road transportation (Edison Tech Centre, 2012). Many of the current EVs used for personal transportation have very similar range, performance, and fuel efficiency ratings. However, they are widely recognized by consumers as being more environmentally friendly when compared to their ICEV counterparts, due to their lower vehicle emissions, reduction in environmentally damaging gasoline engine lubricants, and decrease in fossil fuel consumption (Frenken, Hekkert, and Per 486). EVs have the potential to revolutionize the automotive industry through their lower per kilometre driving cost, reduced number of internally moving parts, regenerative breaking, and recaptured waste heat energy (Yang 171). Reducing the tailpipe emissions problem that is the primary cause of big city downtown smog can be achieved when a sufficient number of vehicles convert to EVs. The electricity required to fuel the vehicle

can also be sourced from renewable resources or less polluting nonrenewable resources such as natural gas or nuclear. For example, 95% of the electricity generated in British Columbia comes from its 31 hydroelectric dams, with the remaining 5% from natural gas ("Hydroelectricity Powers BC Forward"). More and more vehicles are being powered either partially or completely by electricity (Baum 2; Dubin *et al.* 8). It is estimated that within the next five years, automakers across the world will introduce 30 different electric vehicle models, many of which have been predicted to gain rapid consumer acceptance (Dings 13). There is strong evidence that without taking in to account changes from external forces such as financial incentives to purchase, or major advances in battery technology, EVs will make modest market penetration by 2020 and be no more than 25% of new vehicle sales by 2050 (Trigg and Telleen 11; Dings 13). With further improvements in batteries, consumer concern over reliability should also begin to dissipate as EV range approaches the equivalent of one full tank of petroleum-based fuel.

Another benefit of using batteries as a fuel source for an engine is that they offer a good opportunity to store intermittent renewable energy from the sun and wind (Dings 31). Combining the use of renewable energy sources with zero tailpipe emissions will likely promote the rapid adoption of such technology by energy conscious consumers.

Several automakers have been closely watching the reemergence of a market demand for EVs. For example, Tesla's Model S vehicles are capable of driving over 500 kilometers on a single charge and have better engine performance than many mid-size luxury vehicles. They have been able to capture huge publicity and popularization (Tesla Go Electric). With pre-sale orders of 4600 vehicles in 2011 to delivery estimates of over 10000 vehicles in 31 countries in 2013 (Tesla Go Electric), further advances in EV engine and battery technology will only continue increase interest in this class of vehicle.

1.2.1 Electric Vehicle Use in Canada

There is a dearth of information regarding the use of EVs in Canada. In order to determine the breadth of their use in Canada, various police agencies across the country were contacted via telephone and informally questioned as to whether there are EVs used in their vehicle fleet. Upon completing this inquiry, it was discovered that out of the 15 Canadian police departments surveyed, only the Saanich Police Department (SPD) was using EVs¹. Therefore, it was discovered that very little information pertaining to their use in police related duties is available. The lack of data may be due to the fact that EVs are relatively new in any police vehicle fleet program across the country. Nevertheless, data concerning their use are invaluable because these findings may influence the speed and scale in which the department chooses to implement an EV replacement program in their vehicle fleet. These findings may speak to their courage and willingness to innovate by combating vehicle emissions and looking for innovative long-term strategies to minimize their vehicle fleet operating costs.

Despite the absence of EV's in the majority of police departments, there are a number of cities across Canada that currently have a comprehensive EV fleet. Cities such as Toronto, Winnipeg, Edmonton, Vancouver and Victoria are all currently making use of these vehicles in their municipal fleet to complete tasks related to parking enforcement and routine administrative duties. The number of instances that a functioning EV is used in a municipal government vehicle fleet suggests that the feasibility of implementing such a program may be restricted to work of a similar capacity that does not require a specialized vehicle for transportation. Therefore, it may be seen as evidence to support the possibility of implementing an EV replacement program in a

¹ The SPD uses one Mutsubushi EV as a police court liaison vehicle.

police department, to perform routine detective and administrative duties. This finding is important because it demonstrates multiple working examples of EV fleets across the country, performing a similar role as what is envisioned by the VPD.

1.2.2 The United States of America

In order to determine the use of EVs in the United States (US), in late May 2014, selected west coast police agencies (San Jose, Las Angeles, Portland, and Seattle) were telephoned and informally surveyed as to whether EVs were used in their vehicle fleet. Out of the five police departments contacted, none of them were currently using electric vehicles in their vehicle fleet. Similar to the situation in Canada, most of the electric vehicles were registered in the municipal vehicle fleet for the sole purpose of parking enforcement and low-level administrative duties. For instance, the City of Seattle – Fleet Management Division was able to financially justify the purchase of electric scooters (See Table. 3) and successfully operationalize them in to various duties within the city. This finding is important because it demonstrates another working example of EVs performing a similar role as what is envisioned by the VPD.

1.3 Comparison between Electric Cars and Gas Vehicles

Electric vehicles are not a new phenomenon to the North American automobile market (Dings 9). A number of EV models were envisioned following the change of legal landscape of the US in the 1970s when the federal government launched the Federal Clean Car Incentive Program and the Electric and Hybrid Vehicle Research, Development and Demonstration Act,

but these initiatives never materialized (Dings 9). The first known mass-produced² fully electric vehicles in North America had originated in California with the introduction of the Landmark Zero Emission Vehicle (ZEV) Mandate (Dings 9). Beginning in the 1990's, low-volume production ran for several years and was discontinued shortly after, due in part to the weakening of the ZEV mandate (Dings 9). In 2003, Toyota became the last major carmaker to stop producing them (Dings 9). It would seem that the gap in production years tended to coincide most with corporate interest and external pressures such as spikes in the price of oil, regulatory pressures to improve air quality, and legislation to cut CO₂ emissions (Dings 9). The variability in external pressures combined with the competition afforded by ICEVs, meant that the probability of a successfully mass-produced EV at the time, would be limited.

1.3.1 Environmental Impacts

The environmental impacts attributed to owning an EV can be calculated in a variety of ways. Variations in calculation methods can result in discrepancies depending on the type of measurement used and the number of variables included. It is not immediately apparent what should be included in the calculation of assessing the environmental impact. For example, Hawkins *et al.* uses a measurement called Global Warming Potential (GWP) in their assessment of the comparative environmental lifecycle between conventional ICEVs and EVs (53). While Hawkins *et al.* noted that although there are substantial gains in terms of a reduction in the overall life consumption of fuel like gasoline and diesel, the production and operation of EVs can lead to potential increases in human toxicity, freshwater eco-toxicity, freshwater eutrophication,

² Production of this vehicle was limited to 1484 vehicles from 1997-2003

and metal depletion impacts, largely emanating from the vehicle supply chain (53). In 2008, Kendall used a well-to-wheel life-cycle analysis (WTW) in determining their environmental impacts. The WTW analysis included both the production of fuel and combustion of fuel resulting in the car's use (Kendall 156). Tracing the lifecycle back to emissions attributed to oil extraction and refining through the vehicle production to its end of life cycle can have a drastic increase in the total amount of emissions obtained (Kendall 156). However, how far exactly can or should one include in their calculation of the environmental impacts? Should the fuel extraction process and end of life treatment really be included when fuel and materials are a common variable included in both classifications of vehicle? The European Federation for Transport and Environment AISBL in 2009 entered the environmental impacts calculation foray by attempting to analyze exclusively the tank-to-wheel emissions and found that these represent approximately 90% of total emissions of ICEVs. The proportion of electric cars however, is different in that the majority of emissions come from the electricity production (well-to-tank) (Dings 22). Therefore, the environmental impacts are largely determined by the carbon intensity of the power generation used in its production and propulsion (Dings 22). It is important to note that regardless of the method used to estimate the environmental impacts, the overall amount of negative environmental impacts associated with ICEVs seem to outweigh those caused by EVs.

1.3.2 Psychology

Electricity has long been considered as a possible alternative energy source to the traditional petroleum based fuel that vehicles have been dependent on for the last century. However, widespread use of electricity as a fuel source for cars has encountered resistance. Specifically, the perceived limitations of an EV as a mobility resource (Bunch *et al.* 237; Franke

et al. 2), electric battery systems (Hitamura and Hagiwara 2010), and general perceptions of user satisfaction (Francfort and Carroll 1) have acted as primary resisting factors. In addition, financial factors may also suppress their widespread adoption. Such factors can be related to the cost associated with the purchase of a new EV, the installation of electric vehicle charging stations for the home, the costs associated with publically available recharging stations outside of the home, and untraditional vehicle maintenance requirements such as infrequent battery replacements or other one-off repairs that require a higher degree of technological competence than what would be traditionally associated with an ICEV. These factors will cumulatively affect one's perception of EVs.

There has been a slightly stronger acceptance of passenger EVs in the early part of the 21st century. This small change in consumer preference begs the question: why are people choosing or not choosing to purchase electric cars? The answer may rest in current technological advances that have allowed electric cars to be a sufficiently viable option, such that consumers are no longer as concerned about their reliability, range, or safety. Specifically, advances in EV batteries have been a key limiter for the success of electric mobility systems (Kitamura & Hagiwara, 2010). Much research has been done through field trials (Bish and Tietmayer 81; Patil 15), but there are very little data published about the real user experience with range and how the vehicle occupants address this issue. Will there ultimately be a better user experience when driving in an EV or an ICEV? Scientific literature surrounding concepts like anxiety or fear that characterize the nature of the range experience (Botsford and Szczepanek 7; Skippon and Garwood 525) cannot yet definitively conclude one way or the other. Additional studies addressing factors like range optimization behavior (Gregersen *et al.* 302; Steg 148; Steg and Gifford 59), driving schedules, and perceptions of safety should be conducted.

1.4 Project Objectives

This project aims to determine the viability of EVs in the VPD fleet by conducting a limited scan of other police agencies, determining the needs within the VPD, determining the financial feasibility to the organization, and the optimal ratio of vehicles. This project also aims to determine the environmental benefits that would be derived through an estimation of the reduction of fuel consumption and corresponding GHG emissions that would occur from replacing the current ICEVs. Finally, this project makes a holistic recommendation for the viability of implementing EVs as part of the VPDs detective and administrative purposed Ford Fusion vehicle fleet.

2. Methodology

2.1 Operational Feasibility Survey

A survey was designed and distributed to senior detectives and administrative staff managers at the VPD via a secure in-house email system. The survey was developed after carefully considering the nature of possible responses that would be most valuable to the organization. In order to remain as impartial and unbiased in the wording of the questions as possible, questions were written in a non-leading fashion (see Table 4). In order to cover the complete range of possible answers, when possible, open-ended questions were used and the option of “other” was always available. For example, question number eight specifically inquired about the proportion of relevant fleet vehicle trips would be included in an eighty kilometer per day range by asking the following, “A total range of 80 kms would be adequate to serve what percentage of my daily VPD pool car needs?” Respondents were able to view and select one of the following responses “none, a little bit, half, a majority, all.” The email provided detailed instructions about whom the survey was intended for and what was its purpose.

2.2 Total Cost of Ownership (TCO) Analysis

The TCO analysis is based on data provided by the City of Vancouver’s Department of Engineering.

Data analysis were conducted using Microsoft excel version 2011. When examining the relationship between fuel efficiency (litre of fuel/kilometer) and mileage travelled, a linear correlation test was used. Similarly, a linear correlation analysis was used to determine the relationship between maintenance cost and the age of the vehicle. The eight-year lifecycle timeline is the proposed life of the vehicle and is determined by an equivalent annual cost

calculation based on the American Public Works Association method of determining vehicle replacement life. An eight-year lifetime replacement estimation for the vehicles under consideration has been established because it is at this time when the City of Vancouver's Department of Engineering considers to be the benchmark equipment life for police use balances with the point where the equivalent annual cost is at a minimum.

The acquisition cost reflects the purchase price for a 2014 model of either the Ford Fusion gas model or Ford Focus EV. Models prior to 2014 are corrected for 2% annual inflation.

The lifetime fuel reflects the financial burden that the two classifications of vehicles place on the VPD for the duration of 8 years. Specifically, on average, a non-patrol vehicle travels 4,013 kms. This distance is determined by a randomly selected sample containing 17 non-patrol vehicles out of a population of 112 vehicles. For ICE Ford Fusion vehicles, the fuel efficiency is 0.13 litres per kilometer and the Ford Focus EV fuel efficiency is 0.25 kWh per kilometer. Currently, the VPD pays \$1 per litre of gas and \$0.09 per kW. Life fuel is computed by distance travelled multiplied by energy efficiency multiplied by the cost per unit of energy.

For ICE Ford Fusion vehicles, the lifetime maintenance cost is the average of maintenance costs incurred by the randomly selected sample of 17 ICE Ford Fusion vehicles. For the Ford Focus EVs, there is no data available to estimate the maintenance cost, nevertheless, the City of Vancouver's Department of Engineering estimates the annual maintenance budget for electric cars to be \$1,200. Thus for the duration of 8 years, the estimated cost is eight times this number.

Salvage is 5% of the acquisition cost.

The TCO is calculated by combining the cost of vehicle acquisition, life fuel, life maintenance, subtracting salvage.

2.3 Environmental Impacts

In order to assess the environmental impacts by replacing 112 Ford Fusion ICEVs with EVs, data provided by the City of Vancouver Department of Engineering for 2013 were analyzed. GHG emissions estimations were calculated by multiplying litres of fuel by an emissions factor for the mass of CO₂ present in the type of fuel for that year.

3. Results and Discussion

The results of this project have been concluded from vehicle data provided by the City of Vancouver Department of Engineering, an online survey provided to both detectives and administrative employees of the Vancouver Police Department, and written articles (both scholarly and non-scholarly) that discuss various aspects of EVs as they relate to this project. The information disclosed within this section will advance the City of Vancouver's Greenest City 2020 Action Plan goals to 1) eliminate dependence on fossil fuels and 2) minimize the release of GHG emissions from its own vehicle traffic. Specifically, benefits that could be derived through the implementation of these vehicles as replacements for the traditional 4-door ICE models will only come about as a result of careful planning, staggered implementation and a host of other precautions such as charging station training for staff, the establishment of an effective, dedicated, and reliable charging station area for the vehicles to refuel, and a positive experience advertising campaign.

3.1 Survey

A total number of 96 civilian and sworn officers at the VPD responded to an online survey containing a combination of 10 multiple choice and fill-in the blank style survey questions (see Table 4). Based on the responses, it was determined that there are approximately 3 levels of use frequency for existing VPD Ford Fusion pool cars. There is an incidence of high frequency use on Tuesday, Wednesday, and Thursdays followed by an incidence of medium frequency use on Monday and Fridays with an incidence of low frequency use on Saturday and Sundays. Existing VPD Ford Fusion pool cars have a high incidence of user sign-outs occurring between the hours of 6am and 10am (9-32%) with a peak occurring at 7am and a trough

occurring at 6am. Existing VPD Ford Fusion pool cars have a low incidence of user sign-outs occurring between the hours of 12pm and 7pm (1-2%) with a peak occurring at 12pm and a trough occurring at all other times between 1am to 7pm. Existing VPD Ford Fusion pool car users most frequently make use of the vehicle between the hours of 9am and 1pm with less frequent use during the hours of 5am to 8am and 2pm to 5pm. The highest frequency of existing VPD Ford Fusion pool cars being returned occurs between the hours of 1pm to 5pm exclusively and accounts for over 94% of vehicle returns.

Forty-four percent of respondents indicated that a total range of 80 kms would be adequate to serve the majority of their daily vehicle needs, 35% of respondents indicating that a total range of 80 kms would be adequate to serve all of their daily vehicle needs, 12% of respondents indicating that a total range of 80 kms would be adequate to serve half of their daily vehicle needs, 8% of respondents indicating that a total range of 80 kms would be adequate to serve a little bit of their daily vehicle needs and 1% of respondents indicating that a total range of 80 kms would be adequate to serve none of their daily vehicle needs. Seventy-five percent of respondents indicated that they would choose an EV over an ICEV to complete their trip if the total round-trip distance was within 80 kms, 22% of respondents indicated that they would choose an ICEV over an EV to complete their trip if the total round-trip distance was within 80 kms, and 3% respondents indicated that they would choose some other type of car to complete their trip if the total round-trip distance was within 80 kms.

Significantly, 45% of people had indicated that the most important factor to consider when choosing between a gas or electric vehicle was either the range or the reliability followed by 44% of respondents indicating that the most important factor to consider was one of availability of space, performance, battery capacity, and access to a refueling source, followed by

11% of respondents indicating that the most important factor to consider was one of charge time, safety or vehicle familiarity. Overall, two major themes had been observed. Specifically, concerns related to the EVs battery (including response selections like range, reliability, battery capacity, charge time, and refueling source) had accounted for over 42% of responses while concerns related to the vehicles attributes (including space, safety, performance, optics, and practicality) had accounted for 21% of responses. Two minor themes were also observed. Specifically, concerns related to the environment had accounted for 15% of responses and concerns related to the purchase or operating costs of the vehicle had accounted for 8%. Five percent of responses came back as “not sure”.

3.2 Financial Analysis

The replacement of ICEVs with EV at the VPD is financially feasible (see Table 1). By replacing a single ICEV with a single EV the department will save \$9,292 (see Table 1). The majority of these savings come from the difference in the lifetime fuel costs between. This finding is consistent with an American study where Anair and Mahmassani noted that the total ownership of an ICEV would be three times more than an EV (18). Furthermore, these calculations are supported by a study conducted by the City of Seattle, which compared the total cost of ownership for electric scooters against ICE scooters and found similar results (see Table 3).

The fuel consumption is not correlated with the mileage travelled (see Figure 1). In other words, mileage of the car cannot be used to predict fuel efficiency. Similarly, maintenance costs are not correlated with age (See Figure 2). In other words, age of the car cannot be used to predict what its maintenance costs will be.

3.3 Environmental Impacts

In order to assess the environmental impacts by replacing 112 Ford Fusion ICEVs with EVs, data provided by the City of Vancouver Department of Engineering for 2013 were analyzed. In total, the 112 fleet vehicles emit almost 228 tonnes of GHG emissions annually. Over the expected fleet lifetime of 8 years, approximately 1,824 tonnes of GHGs would be emitted³. This estimation does not include the potential environmental impacts caused by the electricity that would be used to fuel the car and the materials that would be used to produce the car. Because only GHG emissions attributed to the burning of fuel from the existing ICEV Ford Fusion vehicles were included for the purposes of this project, approximately 99% of the 1,824 tonnes of GHG would be removed from the environment by a complete EV replacement of all 112 fleet vehicles.

3.4 Limitations

There is a dearth of information regarding the use of electric vehicles in Canadian police departments. An approximate scan had been conducted by contacting the various police agencies across the country but in no way should the results of this scan be seen as being representative of the Canadian police forces across the country in general. Every city across the country is very individualized as far as geographical space covered, range of policing issues that they deal with, climate/environment, budget constraints, etc. Additionally, because of the fact that only vehicles assigned as VPD specific vehicles were included in the results of this survey, many areas of the

³ Assuming a consistent 2013 emissions factor

country were considered to have not been using EVs when in fact they were using them in the city vehicle fleet.

There are a number of other important limitations to acknowledge when discussing the findings based in this project. These limitations pertain specifically to the survey and financial analysis that comprises the basis of the total cost of ownership calculation. For example, one of the limitations of the total cost of ownership calculation is that the calculation does not include the cost of charging stations that will be part of the capital infrastructure improvement costs required for the building. Another limitation to the calculation of the total cost of ownership is that it assumes a constant price of fuel, constant price of vehicle maintenance, and consistent patterns of vehicle usage throughout the duration of the 8-year vehicle lifecycle.

There are several important limitations to take in to consideration when analyzing the results provided by the survey such as questionnaires bias, limited number of respondents and the self-selecting nature of the respondents. These limitations were considered in advance of distributing the survey and reasonable steps were taken to try and ensure against these limitations. For example, every question was carefully worded using the simplest language possible while clearly articulating an open-ended question without leading the participant to select a certain response.

An additional limitation to this project was due to the scheduling constraints provided by the large scope and short project completion deadlines. Overall, this 4-month, student-led project was designed to be the first step towards the implementation of a successful ICEV to EV replacement program. These findings should therefore be considered only as hypothesis for further investigation.

4. Conclusion and Recommendations

The data uncovered by this project will advance the City of Vancouver's Greenest City 2020 Action Plan goals to 1) eliminate dependence on fossil fuels and 2) minimize the release of GHG emissions from its own vehicle traffic.

Overall, it is financially feasible to replace ICEV with EVs at the VPD. The more ICEVs that the department replaces, the more money the department will save. For example, by replacing the entire fleet with EVs, the department will save approximately \$1.04 million (see Table 1).

Without any reduction in operational standards, it was found that the optimal number of electric vehicles could be most appropriately achieved by gradually increasing the EV proportion to a maximum number of 60, when the total fleet capacity is at 112 vehicles. This would work out to a roughly 1:1 proportion of electric: gas vehicles. Based on the survey responses of 96 participants at the VPD, this combination of vehicles would be sufficient to maintain the operational requirements, while saving the department an estimated \$558,000 and removing 977 tonnes of GHGs from the atmosphere.

It is recommended that a gradual replacement of ICEV to EVs occur over a number of years, beginning in year zero with a maximum replacement of 10% of the total vehicle fleet. More data (i.e. life fuel, maintenance, operational feasibility) should then be collected. Subsequently, if demand exceeds availability, and the vehicles can still satisfy a majority of the operational needs, then additional ICEVs should be incrementally substituted.

Lastly, this project recommends the implementation of new policies within the VPD to ensure that the EVs are connected to a charging station as often as possible. For example, EVs should only be able to be reserved a maximum of 30 minutes in advance of the departure time, so

that they remain at the charging stations and connected to the charging port for as long as possible. This may resolve the potential problem of key hogging and help to maintain the internet communications link between the vehicles and the central key desk.

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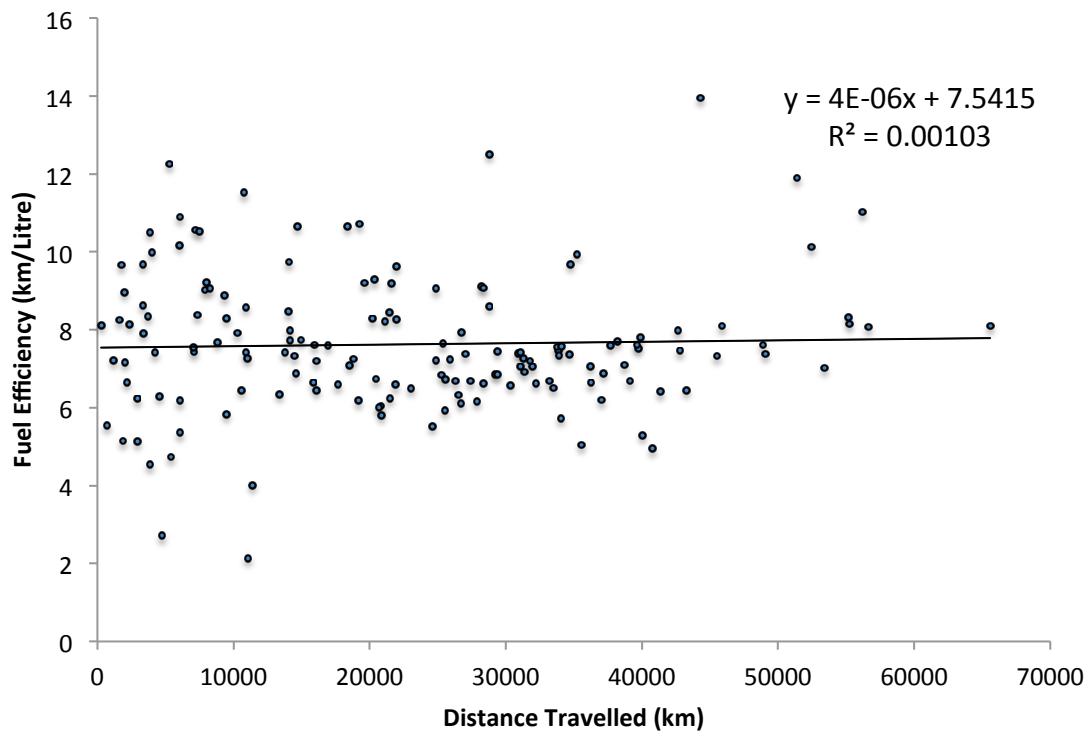


Figure 1. Fuel efficiency data describing fuel efficiency and total distance travelled.

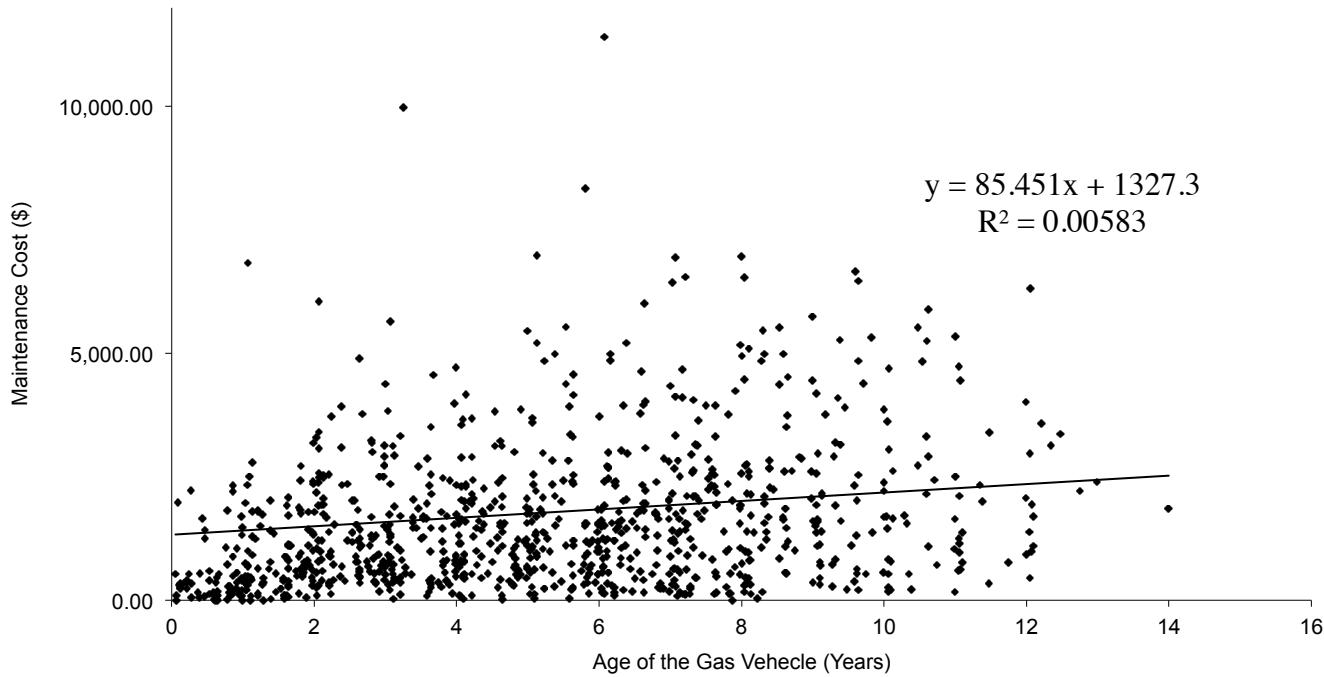


Figure 2. Maintenance cost data describing yearly maintenance cost of gas vehicles.

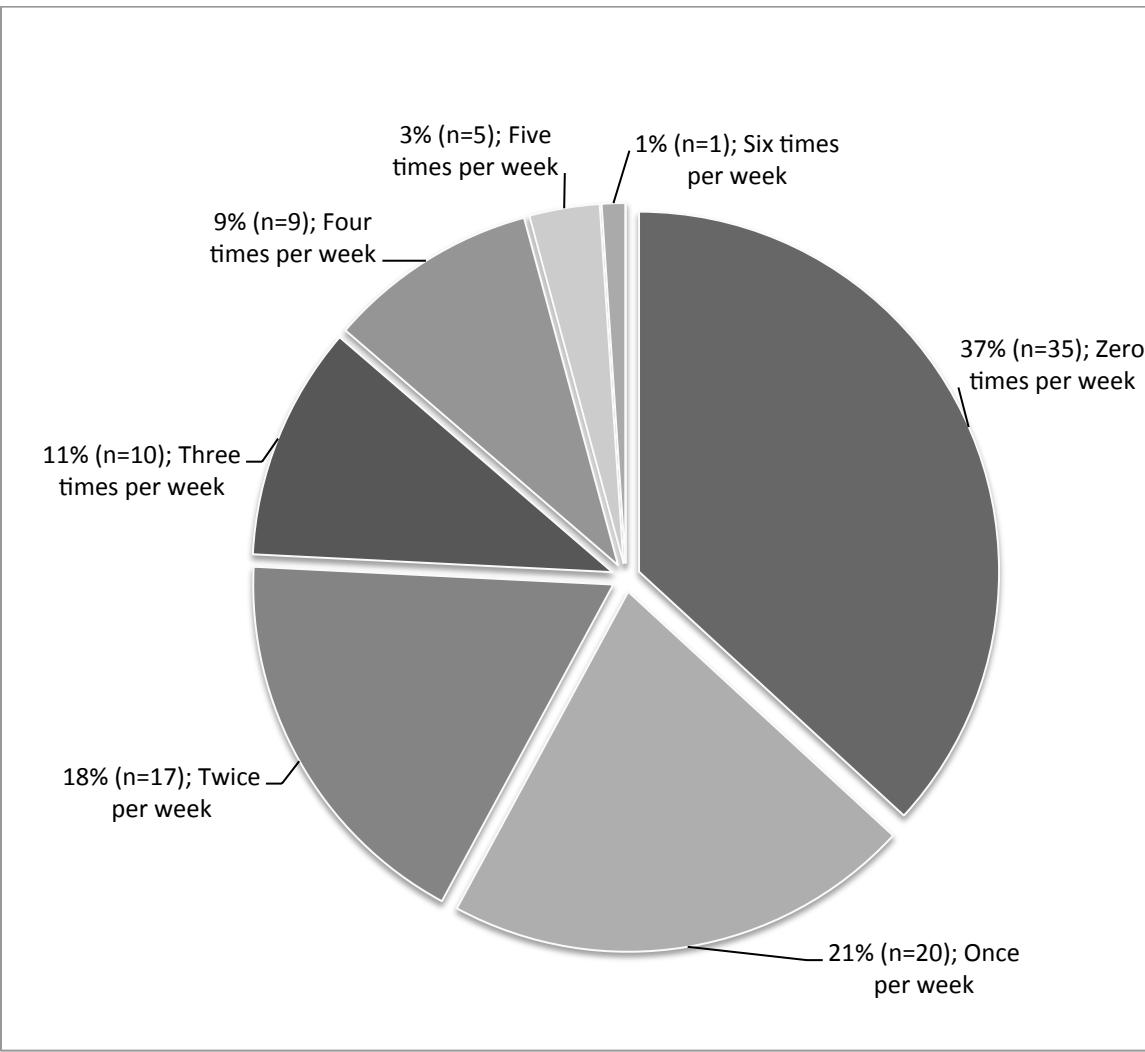


Figure 3. The frequency that each individual officer signs out a Ford Fusion fleet vehicle.

Table 1. Summary of Answers to the Question: When choosing between a gas or electric vehicle, what is the most important factor to consider?

Concerns	# Participants Expressed Concerns	Quotes from the Participants
Automobile Specification Related Concerns	19	<p>Range</p> <ul style="list-style-type: none"> “Doesn't run out of energy in a remote location” “Running out of power for electric vehicle” “Will the electric charge last if I get stuck in a traffic jam” “The ability for it to retain a charge so I am no stuck”
	8	<p>Access to Refuelling Source</p> <ul style="list-style-type: none"> “The ease of finding a charging station vs. a gas station” “Concerned about having to plug in the car” “Ease of charging, availability of charging unit, convenience of charging (underground stall)”
	24	<p>Reliability</p> <ul style="list-style-type: none"> “I have not driven an electric car before so familiarity and reliability” “As electric vehicles are relatively ‘new’ things, I would be concerned that it may not be as reliable as a gas vehicle” “Dependability with flexibility of purpose and distance.” “Dependability, I do not want to be stranded” “Getting stranded out on the road and having to ask for tow” “That it runs”
	11	<p>Battery Capacity</p> <ul style="list-style-type: none"> “Distance to be driven, without having access to power” “Gas b/c sometimes things change on the road and a short trip turns into an all day affair”

Concerns	# Participants Expressed Concerns	Quotes from the Participants
Automobile Specification Related Concerns	3	<p>Battery Charge</p> <ul style="list-style-type: none"> • “Battery close to be fully charged” • “That the car is fueled and ready to go” • “Whether the electric vehicle is fully charged at the time of sign-out”
	10	<p>Comfort / Available Space</p> <ul style="list-style-type: none"> • “Interested only in EV with more cargo space that could hold all of the equipment needed for work” • “Comfort for a 6'1" frame wearing an operational uniform” • “Storage capacity” • “Size of the cabin (Big enough)”
	3	<p>Safety</p> <ul style="list-style-type: none"> • “Safety. Pedestrians don't hear electric car and the driver has to be extra vigilant that pedestrians will step in front of a moving EV more often”
	9	<p>Availability</p> <ul style="list-style-type: none"> • “That the car is fueled and ready to go” • “Which one is available” • “If the electric car is charged and ready to go”
	13	<p>Performance</p> <ul style="list-style-type: none"> • “The size and power of the car” • “Performance if required to assist on a call” • “Ability to perform emergency duties if/when required.” • “Acceleration of the vehicle” • “Torque and handling”
Psychological Barriers	6	<p>Familiarity</p> <ul style="list-style-type: none"> • “The actual operation of the electric vehicle” • “I have not driven an electric car before so familiarity” • “I don't know enough about electric cars”

Concerns	# Participants Expressed Concerns	Quotes from the Participants
Psychological Barriers	3	<p>Optics</p> <ul style="list-style-type: none"> “Generally I think use of electric vehicles yields excellent optics and is in line with the City and VPD's strategic goals” “Does it look good.”
	3	<p>Practicality</p> <ul style="list-style-type: none"> “Role for using the car”
Environmental Concerns	22	<p>Fuel & Emissions</p> <ul style="list-style-type: none"> “I would use the electric vehicle. It is better for the environment” “Reduce emissions” “Whichever is more environmentally friendly but will still work” “Going green” “I don't need an "operational" vehicle so electric is important for gas savings” “Electric for the environment” “No need for gas for short trips”
Financial Concerns	12	<p>Operating Cost</p> <ul style="list-style-type: none"> “Cheaper to operate” “The green benefits could be overshadowed by costs, etc., if indeed these vehicles are costly to operate” “Cost to the city” “Money”
Spoiled Response	8	<p>Spoiled Responses</p> <ul style="list-style-type: none"> “Not sure” “It is difficult to answer as I have never driven an electric vehicle before” “The car itself” “*” “Purpose of trip - operational vs. meeting”

Table 2. VPD Total Cost of Ownership (TCO) Analysis

Type	Model	Life Cycle	Acquisition ¹	Life Fuel ⁴	Life Maintenance	Salvage ⁶	TCO ⁷	Fleet Cost (112 vehicles)
Gas	Ford Fusion	8	\$35,647 ²	\$5426	\$14,957	\$1,392	\$54,638	\$6,119,456
EV	Ford Focus	8	\$36,867 ³	\$722	\$9,600 ⁵	\$1,843	\$45,346	\$5,078,752

¹ Up-fitting cost is not included. Models prior to 2014 are corrected for (2% annual) inflation.

² The price is established based on the department purchase of six 2013 Ford Fusion vehicles.

³ The price is established based on the department purchase of two 2014 Ford Focus EV's.

⁴ Fuel assumptions: 4013 km/year (the average distance driven by a non-patrol vehicle is determined by a randomly selected sample containing 17 cars, out of a population of 118); 0.13 liter/km of gas (the fuel efficiency value is determined by a randomly selected sample containing 17 cars, out of a population of 112); City of Vancouver most recent estimates for the cost of fuel for both vehicle types is \$1.30/liter of gas; EVs kWh cost = \$0.09/kWh; 0.25kWh/km. Currently, 112 internal combustion detective/administrative fleet vehicles are in operation at Vancouver Police Department.

⁵ The City of Vancouver Department of Engineering estimates the annual maintenance cost for Ford Focus EV's to be \$1200.

⁶ Salvage value is based on a 5% resale value of the acquisition cost.

⁷ Total Cost of Ownership (TCO) = Acquisition Cost + Lifetime Fuel + Lifetime Maintenance - Salvage

Table 3. City of Seattle Total Cost of Ownership (TCO) Analysis

City of Seattle - Fleet Management Division

Total Cost of Ownership (TCO) Analysis of PEO Scooters: Gas vs. EV							
Type	Life Cycle	Acquisition ¹	Life Fuel ²	Life Maint	Salvage ³	TCO ⁴	Fleet Cost (78 scooters)
Gas	7	\$ 32,660	\$ 7,870	\$19,220.25	\$ 6,532.0	\$53,218.52	\$ 4,151,044.78
EV	7	\$ 40,230	\$ 1,274	\$ 4,152.82	\$8,045.92	\$37,610.51	\$ 2,933,620.08

¹ Upfitting not included. Models prior to 2014 corrected for (3% annual) inflation

\$ **1,217,424.71** City Savings by converting to EVs

² Fuel assumptions: 5200 miles/yr; \$4/gal; EVs kWh cost = \$0.035/mi; Gas PEO MPG = 18.5

³ 20% resale value assumed for PEO Scooters (not available on Kelley Blue Book).

⁴ TCO = (acq cost + fuel + PM) - salvage value

Table 4. VPD EV Survey Questions

1. What is the exact email address at which you received the link to this survey? Note: you will not receive follow-up information after completing this survey.
2. On what days of the week do you most frequently use a VPD pool car (i.e. Ford Fusion)?
3. In the past, at approximately what time did you sign-out a VPD pool car?
4. During what time(s) have you driven, or most frequently drive a VPD pool car? (Select multiple times if necessary)
5. In the past, at approximately what time did you return the VPD pool car?
6. In the past, approximately how many times per week did you sign out a VPD pool car?
7. Think back to the last time you used a VPD pool car. Approximately what neighbourhood did you drive to and how many kilometres did you drive in total? Approximately what neighbourhood did you drive to? Approximately how many kilometres did you drive in total?
8. A total range of 80 kilometres would be adequate to serve _____ of my daily VPD pool car needs?
9. If either car were available, which would you choose for a trip within 80 kilometres?
10. When choosing between a gas or electric vehicle, what is the most important factor to consider?

PREScott
EST 1784
THE FORT TOWN

Regular Council
December 11, 2017

374 - 2017

Moved by:

Flasko

Item 11.2

Seconded by:

Mike Orlitzky

WHEREAS the volume of traffic along Highway 401 through Eastern Ontario is at the point where the current four-lane design is inadequate;

AND WHEREAS the congestion due to the rising number of commercial and regular vehicles is putting the safety of motorists and first responders at risk;

AND WHEREAS since May 2017 there have been 12 fatal crashes on Highway 401 between Trenton and Cornwall that have claimed the lives of 16 people and injured 18 others;

AND WHEREAS these collisions result in prolonged closures of the highway that put a strain on emergency resources and create dangerous conditions on secondary roads not designed for heavy traffic volumes;

AND WHEREAS expanding Highway 401 to six lanes through Eastern Ontario is essential to public safety and supporting the region's economy;

AND WHEREAS in response to the dangerous situation on the highway through Eastern Ontario, the Minister of Transportation stated: "At this time, the ministry does not have plans to widen Highway 401 through this area."

PREScott
EST 1784
THE FORT TOWN

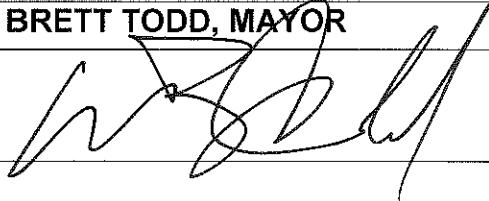
The Town of Prescott

THEREFORE BE IT RESOLVED THAT (Municipality) supports expanding Highway 401 through Eastern Ontario to six lanes and that the Ministry of Transportation add the expansion plans to its Southern Highways Program.

AND FURTHER THAT copies of this resolution be sent to the Minister of Transportation, AMO, ROMA and the MPPs representing Eastern Ontario.

*+ local mun. esp. 4 lanes
upper & lower tier*

REQUESTED BY:		
RECORDED VOTE	YES	NO
Councillor Leanne Burton		
Councillor Teresa Jansman		
Councillor Fraser Laschinger		
CARRIED:	<i>✓</i>	
TABLED:		
DEFEATED:		
RECORDED VOTE:		

BRETT TODD, MAYOR	KIMBERLEY CASSELMAN, CLERK
	

**Report to Finance and Administration Committee
January 16, 2018**

**2018-006-01
2018 Municipal Election
Council Restrictions after Nomination Day**

**Sandra MacDonald
City Clerk**

RECOMMENDED

THAT Council receive report 2018-006-01, 2018 Municipal Election, Council Restrictions after Nomination Day for information purposes.

ORIGIN

The City Clerk is the originator of this matter.

ANALYSIS

The 2018 Municipal Election Day is set for October 22nd, 2018. The *Municipal Act*, 2001 restricts certain actions of Council if the council is deemed to be "lame duck" as early as Nomination Day, Friday, July 27th, 2018.

A council is deemed to be lame duck if the new council will include less than three-quarters of the members of the outgoing council. The determination shall be made in one or two separate time periods.

The first period is from Nomination Day to Election Day, July 27th to October 22, 2018. Nomination Day is significantly earlier than previous elections (was previously first Friday in September). The second time period runs from October 22nd (Election Day) to November 30th (end of the term). The City Clerk shall make a determination as to whether council's powers are restricted in accordance with the *Municipal Act*, Section 275 based on the nominations and the election results.

The restrictions placed upon the outgoing council are;

- a) The appointment or removal from office of any officer of the municipality;
- b) The hiring or dismissal of any employee of the municipality;
- c) The disposition of any real or personal property of the municipality which had a value exceeding \$50,000 when it was acquired by the municipality; and
- d) Making any expenditures or incurring any other liability which exceeds \$50,000.

2018-006-01

2018 Municipal Election

Council Restrictions after Nomination Day

Page 2

Appointment or removal from office of any officer of the municipality

For the Corporation of the City of Brockville, the following is the list of officers whom have been appointed:

- City Manager
- City Clerk
- Deputy City Clerk
- Treasurer
- Deputy Treasurer
- Tax Collector
- Fire Chief
- Deputy Fire Chief
- Chief Building Official

These officers cannot be removed or a new appointment made during the lame duck period.

Hiring or dismissal of any employee

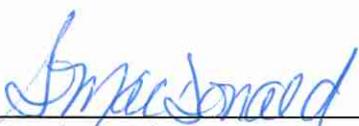
Council has previously delegated this authority to the City Manager, therefore this will not be impacted.

Disposition of real or personal property and expenditures or incurring liability in excess of \$50,000

Restriction listed as clauses c) and d) do not apply if the disposition or liability was included in the most recent budget adopted by the council before nomination day.

FINANCIAL ANALYSIS

There are no financial considerations associated with this undertaking.



S. MacDonald
City Clerk



D. Dick, CA, CPA
Director of Corporate Services

B. Casselman
City Manager

JANUARY 8, 2018

**REPORT TO FINANCE & ADMINISTRATION & OPERATIONS COMMITTEE –
January 16, 2018**

2018-007-01

PROVINCIAL-MUNICIPAL GAS TAX AGREEMENT **D.DICK, CPA, CA**
DIRECTOR OF CORPORATE SERVICES

RECOMMENDATION

THAT Report No. 2018-007-01 dated January 8, 2018 regarding Provincial-Municipal Gas Tax Agreements be received for information.

AND FURTHER THAT the Mayor and Director of Corporate Services be authorized to sign the "Municipal Funding Agreement for the Transfer of Dedicated Gas Tax Funds" on behalf of the City of Brockville.

AND FURTHER THAT staff be authorized to bring forward a by-law to execute the Municipal Funding Agreement between the Association of Municipalities of Ontario (AMO) and the City of Brockville, and all subsequent agreements or amendments with respect to the Dedicated Gas Tax Funds with the Association of Municipalities of Ontario.

PURPOSE

To inform on the terms and conditions of the Provincial Gas Tax Agreement, to authorize its signing on behalf of the City of Brockville, and to bring forward a bylaw for its execution.

BACKGROUND

As the Province desires to increase public transportation, the Ministry maintains a dedicated gas tax fund for public transportation under which two cents of the existing provincial gas tax will be provided to municipalities for public transportation expenditures.

The funding to be used for public transportation as follows:

1. To support increased public transportation ridership in the municipality, the Ministry agrees to provide funding in the amount of \$223,047.
2. Despite section 1, the Municipality understands that the amount payable may be subject to the Minister's sole discretion to adjust this amount.
3. The Municipality shall deposit these funds into a dedicated gas tax reserve fund using such funds and any accumulated interest in accordance with the guidelines and requirements of this agreement.

ANALYSIS

The City will receive \$223,047 over the fiscal period ending April 30, 2018. Staff has already identified projects that will benefit from Gas Tax revenues in the 2018 budget.

POLICY IMPLICATIONS

The City is now in receipt of the new letter of agreement outlining the terms and conditions of the funding agreement and it must be executed through a municipal by-law.

CONCLUSION

Staff recommends that the requirements set by the Provincial Government be approved so that the provincial funding may be received.



D. Dick, CPA, CA
Director of Corporate Services

 followed by the handwritten suffix "for"

B. Casselman,
City Manager

**Report to the Finance Administration and Operations Committee
January 16, 2018**

2018-010-01

**Fire Dispatch Communication
Service Agreement
The Corporation of the Town of Prescott**

**G. Pigeon, Fire Chief
R. Rayner, Deputy Fire Chief**

Recommendation

THAT Council authorizes the Mayor and Clerk to execute a Fire Dispatch Communication Service Agreement between the City of Brockville and the Corporation of the Town of Prescott for the period of five years commencing on January 1st, 2017 and ending on December 31st, 2021.

Background

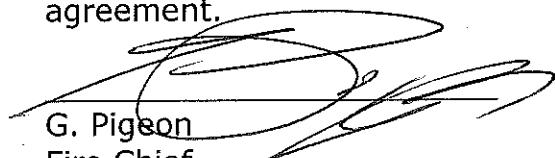
The Corporation of the United Counties of Leeds and Grenville issued a request for proposal requesting proposals to provide fire dispatching communication services for its member and non-member municipalities and towns; the Corporation of the City of Brockville submitted a proposal in response and was the successful proponent; Brockville agrees to provide services to the Town of Prescott in accordance with its proposal.

Policy Implications

The proposed agreement reflects the agreement reached with the United Counties of Leeds and Grenville, and shall include through this agreement the Corporation of the Town of Prescott. This agreement contains the entire agreement between the parties and supersedes any previous agreement in writing or otherwise made between the parties hereto with respect to the subject matter hereof.

Financial Considerations

The proposed and recommended agreement meets the client/partners desire of a fixed yearly service fee which is the product of the cost per capita and the total population for the Town as set out in Schedule "B" attached to the agreement.



G. Pigeon
Fire Chief

B. Casselman
City Manager

Renny Rayner
Deputy Fire Chief

D. Dick, CPA, CA
Director of Corporate Services

Fire Dispatch Communications Service Agreement

This agreement made this 27th day of November, 2017, between:

The Corporation of the Town of Prescott
hereinafter referred to as "the Town"

AND

The Corporation of the City of Brockville
hereinafter referred to as "Brockville"

WHEREAS the Town wishes to purchase fire dispatch services for its geographical area;

AND WHEREAS pursuant to Section 8 of the *Municipal Act, 2001*, as amended, the municipality is empowered to pass by-laws for the operation of the municipality and to enter into agreements;

AND WHEREAS the City of Brockville and the Town of Prescott are authorized by subsection 2(5) of the *Fire Protection and Prevention Act, S.O., 1997*, Chapter 4 to enter into agreements with other municipalities to provide and receive fire protection services;

AND WHEREAS the Corporation of the United Counties of Leeds and Grenville issued a Request for Proposal (#IT – 2016 – 01) March 16, 2016 requesting proposals to provide fire dispatching communication services for its member and non-member municipalities and towns;

AND WHEREAS the Corporation of the City of Brockville submitted a proposal in response to the Request for Proposal and was the successful proponent;

AND WHEREAS Brockville agrees to provide services to the Town in accordance with its Proposal which is attached to this Agreement as Schedule "A" and in accordance with the terms of this Agreement;

NOW THEREFORE this Agreement witnesses that for the consideration specified herein and other good and valuable consideration, the sufficiency of which is acknowledged by the parties, the parties hereby agree as follows:

1. BROCKVILLE RESPONSIBILITIES

Brockville shall provide all fire dispatch and communication services in accordance with a proposal submitted by Brockville in response to the Request for Proposals, attached to this Agreement as Schedule "A". Without limiting the generality of the foregoing, Brockville shall provide the following services to all organized fire departments in the United Counties of Leeds and Grenville, and shall include through this agreement the Corporation of The Town of Prescott

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

- a) Answer all emergency calls relative to the organized Municipal Fire Departments covered by this agreement.
- b) Provide systems maintenance of the Computer Aided Dispatch, dispatch consoles and other equipment that makes up the fire dispatch centre.
- c) Notify by pager, smartphone application or traditional 'phone tree' methodology all firefighters in the area where the emergency occurs.
- d) Send notification pages, such as a vehicle out of service, or training announcements as required.
- e) Provide weekly pager tests and radio tests.
- f) When dispatching a Fire Department for an incident, provide any special information recorded in CAD, such as the closest water source or hazards, as provided by the Fire Chiefs to Brockville Dispatch (see Clause 2. g)).
- g) Provide after incident reports by fax or email, once the last vehicle is in station and the call is closed.
- h) Support hearing impaired callers who use Text to 911.
- i) Receive emergency alerts from radios operating on the Motorola Conventional P25 radio system, match the radio ID to an alias to uniquely identify the radio issuing the alert and follow the communications SOP to resolve and clear the alert.
- j) Monthly testing of the alternate (backup) dispatch centre to ensure staff are familiar with the backup site, test equipment to make sure it is operating properly and to confirm all onsite supplies are available.
- k) Retain records of the emergency calls which will include but not limited to recording benchmarks, including but not limited to the following:
 - If available, date and time call originally answered (9-1-1 or local)
 - Date and time call conferenced (9-1-1)
 - Date and time call answered by downstream agency (9-1-1)
 - Date and time alarm dispatched
 - Date and time alarm acknowledged
 - Date and time each apparatus mobile
 - Date and time each apparatus on scene
 - Number of personnel on each apparatus
 - Date, time and name of officer assuming command
 - Date and time agent was applied
 - Date, time and name if command is transferred
 - Date and time "All Clear", if applicable
 - Date and time "Under Control", if applicable

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

- Date and time "Loss Stopped", if applicable
- Any other records that may be required by the Ontario Fire marshal or as provided by the incident commander on scene.

Such records shall be retained in accordance to the City of Brockville's Records Retention By-Law or Policy, or any other applicable legal requirements.

- I) In accordance with the process referenced in Clause 1.q) of this agreement, provide copies of digital recordings of radio transmissions as requested by a Fire Chief or their designate, or as may be required by law, for communications when any of the departments covered by this agreement are operating on either of the two (2) county wide digital P25 radio system channels. The Fire Chiefs and City shall establish a Standard Operating Guideline to address this Clause, including who may request the recordings.
- m) Provide dispatch staff in accordance with Option 3, or as otherwise selected by the Counties, and ensure dispatch staff are trained to meet the job performance requirements for Public Safety Telecommunicator II as defined in chapter 6 of NFPA 1061.
- n) Maintain a documented training plan, which defines the training required for each job function within the dispatch centre.
- o) Provide a designated dispatch Supervisor with the skills and knowledge outlined in NFPA 1061, chapter 9.
- p) Provide a designated Training Officer and Training Coordinator function, with responsibility for coordination and planning of dispatch staff training, as outlined in NFPA 1061, chapters 8 and 11.
- q) Provide an agreed upon, documented process for Fire Chiefs (or their designated alternate) to request specific call information and radio transmission recordings. The initial process document must be written and approved by The Town of Prescott, Brockville and the Counties not later than May 31 2017. Amendments to the process will be reviewed, documented and approved by Brockville and the Counties as part of the regular Service Review Meetings.
- r) Provide an agreed upon, documented process, for UCLG and the Fire Chiefs (or their designated alternate) to liaise with the dispatch centre. The initial process document must be written and approved by The Town of Prescott, Brockville and the Counties not later than May 31 2017. Amendments to the process will be reviewed, documented and approved by Brockville and the Counties as part of the regular Service Review Meetings.
- s) Notify the UCLG radio and pager service provider in the event that a system impairment is identified, to initiate investigation and repair.
- t) Notify other agencies as requested during an incident, through the use of predefined lists for specific types of incident, as well as real time requests by responding fire departments. Examples include, but are not limited to, calling Police, Paramedics, utility companies &/or Public Works, depending on the situation. The dispatch centre shall maintain and update a list of phone numbers for these services in each Municipality.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

- u) Should there be a catastrophic failure within the communication centre and or with the United Counties of Leeds and Grenville radio / paging infrastructure the dispatch centre will immediately notify the Fire Chief and or designate of each dispatched municipality of the failure so that the Fire Chiefs or designates can take the necessary steps to manually relay call incident details to their personnel (i.e. staff stations, phone tree etc.)
- v) Notify the County Fire Coordinator of pre-defined significant events. The County Fire Coordinator is responsible to maintain the list of pre-defined significant events, in agreement with Brockville. If Brockville and the Fire Coordinator cannot reach agreement on the list, the matter will be included in the next Service Review Meeting. The Fire Chiefs and City shall establish a Standard Operating Guideline to address this Clause, including the definition of a 'pre-defined significant event'.
- w) The City of Brockville is responsible for the operation, maintenance and upgrades of the equipment required to provide the Fire Dispatch Service, as outlined in section 7.
- x) Notwithstanding Clause 1.w) above, the parties agree that the Brockville Fire Services is subject to budgetary and procurement processes that may require time for upgrades and such major work, and such reasonable time requirements shall be respected by the Counties.

2. TOWN OF PRESCOTT AND LEEDS AND GRENVILLE SHARED RESPONSIBILITIES

The following has been transcribed from the agreement between the Counties of UCLG and the City of Brockville, use of the County Radio system by The Town is outside this agreement in a separate agreement.

The United Counties Leeds and Grenville agrees to provide or facilitate and maintain the provision of the following:

- a) The United Counties of Leeds and Grenville owns and is responsible for the operation, maintenance and upgrades of the radio and paging system, including the radio sites and the microwave links and gateway routers that make up the Wide Area Network (WAN) backbone. The County is also responsible for the microwave links and routers that make up the Brockville WAN, connecting Brockville Fire Headquarters (HQ) building (Station 2) and the Police Headquarters (HQ) building, to the Brockville prime radio site.
- b) Maintain and upgrade as required,
 - The P25 digital radio communication system made up of 8 radio sites across the County, providing two (2) County wide radio voice channels shared by the participating fire departments.
 - The digital paging system made up of 9 radio sites across the County.
 - The microwave radio ring that links the voice and paging radio sites together, plus a second microwave ring that links the City of Brockville Fire and Police headquarters.
 - The backup power system in the enclosed equipment area at Brockville Fire Station 2, used for powering the microwave and paging equipment as well as the City of Brockville K CORE.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

- c) Maintain a contract for the maintenance of the Counties-owned digital radio and paging systems, including all equipment up to the demarcation point with the City of Brockville.
- d) Maintain and update GIS (Geographic Information System) data including civic addresses, streets and other supporting data, sent from the Counties partner Municipalities.
- e) Upload county GIS data to Crisys for the Brockville Computer Aided Dispatch System.
- f) The Town of Prescott shall pay the City of Brockville monthly equal payments based on the annual per capita costs set out in Schedule B of this agreement.
- g) Fire Chiefs within the partner Municipalities are responsible to identify to Brockville, any special information such as telephone contacts, water fill sites or hazardous material sites, that they want identified in the CAD.
- h) Provide the City of Brockville access to the County radio system for Brockville fire department radio communications and paging.

3. ALARM (CALL) PROCESSING TIMES

- a) The Dispatch and communications service provided by Brockville must meet the alarm processing requirements as defined by the National Fire Protection Association (NFPA) standard NFPA 1221, Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.
- b) Brockville will provide a report to the Counties, by the 15th day of each month with the call processing statistics for the previous month.
- c) If the NFPA call processing requirements are not met for two successive months, or three months over a 6 month period, Brockville, either on its own or at the request of The Counties, shall meet to review the circumstances and determine what additional equipment or human resource are required to meet the requirements. If Brockville and the Counties and The Town of Prescott are unable to agree that call processing times need improvement, then the issue will be brought to the Leeds Grenville Fire Services Communications Technical Committee for review.
- d) At any time during the term of this agreement, the Counties may elect to change the selected option with respect to dispatch staffing levels to options 1 or 2 as described in Schedule "B" attached to this agreement. Once the staffing levels have been altered by Brockville in accordance with the selected Option in Schedule "B", the Counties and the Town shall be obligated to make payments for the remainder of the agreement based on the cost of the new option, prorated over the balance of the term of the agreement.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

4. DISPATCH UPGRADES

- a) By May 31, 2017, Brockville must provide written confirmation and a site tour, to demonstrate system and facility improvements identified in the Brockville RFP proposal attached to this agreement as Schedule "A" are completed. These include, without limitation:
 - i. UPS - *"Two central bank UPS systems are budgeted for 2016, and will be installed in the Q3 of 2016. These will be monitored for advance troubleshooting and will have internal redundancy. The systems are totally supported to allow time to move to the alternate location should the move be required."*
 - ii. CAD Integration - *"Total integration of Crisys CAD with the radio system, the paging system, 9-1-1 NG, alarm monitoring and the Who's Responding application is planned for the Q3 2017."*
 - iii. Backup facility improvements - *"Brockville Fire Dispatch presently has a back-up facility at the Brockville Police station. The facility meets the present requirements. Any upgrades and modifications will ensure it meets the goals stated in NFPA-1221 4.1.5."*
 - iv. Dispatch staff training - *"All Brockville Fire Dispatch communicators will meet the Job Performance Requirements (JPR's) for NFPA-1061 by Q3 of 2017; All new employees will be trained to the required certification immediately upon hiring."*
- b) If Brockville is unable to complete the upgrades by December 31st, 2017, the County may, at its sole discretion, terminate the agreement following the termination process in section 8 of this agreement, or withhold up to 25% of the service fee until such time as the upgrades are completed.

5. SERVICE REVIEW MEETINGS

- a) Brockville the Counties and the Town will meet at a minimum on a quarterly basis to review the fire dispatch and communications service, including review of the call processing statistics and review any questions or complaints from Fire Chiefs regarding specific incidents or service delivery in general. The number of meetings per year can be changed with the mutual consent of Brockville and the Counties and the Town
- b) At the first meeting of each year, Brockville shall provide a copy of the training plan and a record of current supervisor and dispatcher qualifications.
- c) The quarterly meetings will commence on or about January 30, 2017, and will include a set of key performance indicators that will be reviewed on a meeting by meeting basis, including but not limited to:
 - Alarm (Call) processing statistics
 - Dispatch centre service delivery

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

- Incidents not resolved by a Fire Chief and Dispatch Supervisor
- Fire Department communications and interaction with Dispatch
- Dispatch Upgrade Requirements as specified in RFP response

6. TERM

The term of this agreement is five (5) years, from January 1, 2017 to December 31, 2021.

7. FEES

- a) The cost for Fire Dispatch service provided by Brockville Fire Department is based on a fixed yearly service fee which is the product of the cost per capita and the total population for the Town as set out in Schedule "B" attached to this agreement.
- b) The Town shall pay for the services to be provided by Brockville in accordance with option 3 as described at Schedule "B":

"Option 3: One dispatcher per shift plus up staffing during any major incident and known event, based on existing call volume. All our options meet NFPA-1221."

Up staffing will be provided by an NFPA qualified dispatcher within 15 minutes, during any major incident and as pre-defined by the Fire Chiefs for a known event, based on existing call volume. The initial list of pre-defined events, as noted in Section 1, Paragraph v), must be written and approved by Brockville and the Counties not later than May 30, 2017. Amendments to the process will be reviewed, documented and approved by Brockville and the Counties as part of the regular Service Review Meetings.

- d) All financial liabilities, capital and operating expenses associated with the purchase, installation, operation, maintenance and upgrades of the equipment required by Brockville to provide the Fire Dispatch Service to the Counties and The Town are the sole responsibility of Brockville as the service provider, and is deemed to be included in the fee for service. This includes but is not limited to:
 - i. CriSys Computer Aided Dispatch system, including ongoing operation, support and any hardware or software upgrades to maintain manufacturer's current supported version requirements.
 - ii. Motorola Dispatch consoles, K CORE and gateway switches interfacing to the demarcation point between the Brockville Fire Department and the United Counties of Leeds and Grenville. This includes the costs for upgrades to maintain compatibility with the radio system.
 - iii. Dispatch centre facilities including building, backup generators, Uninterruptable Power Systems (UPS), security and structural requirements, to meet NFPA 1221 standard for primary and alternate dispatch centres.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

- iv. Implementation of new 911 capabilities and services. (i.e. EMS Automatic/Simultaneous notification to Fire Departments for medical emergencies requiring Fire Dept response, NG 9-1-1 capabilities, current legislated requirements, etc.)
- v. All staffing costs associated directly and indirectly with fire dispatching, including but not limited to the costs of management, corporate support and overhead.

8. AMENDMENTS

- a) This Agreement may be amended, from time to time, by the mutual consent of both parties.
- b) Notwithstanding Clause 8a) above, Clause 10, Arbitration, does not apply. In other words, neither party may request arbitration for an amendment to this Agreement.

9. TERMINATION

Either party may, at any time, upon one hundred eighty (180) days written notice to the other, may terminate this Agreement.

10. ARBITRATION

- a) If there is any dispute arising out of, or relating to, this Agreement, the parties will use reasonable good faith efforts to resolve such dispute, first by direct negotiation and then, if that is not successful and if the parties so agree, by mediation with a neutral third party mediator acceptable to both parties. Each party will bear its own costs and expenses in connection with any mediation and all costs and expenses of the mediator will be shared equally by the parties.
- b) If a dispute is not settled by negotiation or mediation within a reasonable time, either party may give written notice to the other requiring the dispute to be settled exclusively by binding arbitration by a single arbitrator.
- c) The arbitration shall be conducted by a single arbitrator if the parties hereto agree upon one or otherwise by an arbitrator appointed by a Judge of the Ontario Superior Court of Justice. The arbitration shall be conducted in accordance with the provisions of The Arbitration Act (Ontario), and any statutory amendments thereto for the time being in effect.
- d) Each party to the arbitration shall pay their own costs and the costs of the arbitration shall be divided equally as between the parties.
- e) The decision of the arbitrator shall be binding and shall not be subject to appeal.
- f) It is hereby agreed that it shall be a condition precedent to any action being instituted by either party hereto against the other or of any liability in connection therewith that the

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

matter must be first referred to arbitration as herein provided for disposition.

11. INSURANCE

Each party, at their own expense shall maintain insurance requirements for the duration of the agreement as noted below:

Municipal Liability issued on an occurrence basis for an amount of not less than \$20,000,000. per occurrence / \$20,000,000. annual aggregate for any negligent acts or omissions relating to their obligations under this Agreement. Such insurance shall include, but is not limited to bodily injury and property damage including loss of use; personal injury; contractual liability; premises, property & operations; non-owned automobile; broad form property damage; products & completed operations; owners & contractors protective; occurrence property damage; employees as Additional Insured(s); contingent employers liability; cross liability and severability of interest clause

The Town of Prescott shall add the City of Brockville as Additional Insured. This insurance shall be non-contributing with and apply as primary and not as excess of any insurance available to the City.

The City of Brockville shall add the Town of Prescott as Additional Insured. This insurance shall be non-contributing with and apply as primary and not as excess of any insurance available to the Municipality.

Each party shall maintain Professional liability (errors and omissions) insurance coverage shall be obtained to a limit of not less than \$20,000,000. The Town of Prescott shall also include Medical Malpractice to a limit of not less than \$20,000,000. If such insurance is written on a claim made basis, the coverage shall be maintained for a period of two years subsequent to conclusion of services provided under this Agreement.

The Town of Prescott shall also provide evidence of Automobile liability insurance with respect to owned or leased vehicles used directly or indirectly in the performance of the services covering liability for bodily injury, death and damage to property with a limit of not less than \$20,000,000. inclusive for each and every loss.

The Town of Prescott shall be responsible for the physical damage to their equipment used in providing services as outlined in the agreement.

Any applicable Deductible to any insurance coverage shall be the sole responsibility of the Named Insured.

Each party shall provide the other parties with a certificate of insurance evidencing the above noted coverage including a 30 day notice of cancellation.

In addition to General Insurance, each party shall provide evidence of WSIB or its equivalent.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

12. INDEMNITY

- 12.1 The Town of Prescott covenants and agrees to defend, indemnify and save harmless the City of Brockville, their elected officials, officers, employees and members of the Brockville Fire Department from and against any and all claims, actions, losses, expenses, fines, costs (including legal costs), interest or damages of every nature and kind whatsoever, including but not limited to bodily injury or to damage to or destruction of tangible property including loss of revenue arising out of or allegedly attributable to the negligence, acts, errors, omissions, whether willful or otherwise by the Town, their officers, employees, agents, or others who the Town is legally responsible, in respect to this agreement. This indemnity shall be in addition to and not in lieu of any insurance to be provided to the City in accordance with this agreement, and shall survive this agreement.

- 12.2 The City of Brockville covenants and agrees to defend, indemnify and save harmless the Town of Prescott, their elected officials, officers, employees and members of the Prescott Fire Department from and against any and all claims, actions, losses, expenses, fines, costs (including legal costs), interest or damages of every nature and kind whatsoever, including but not limited to bodily injury or to damage to or destruction of tangible property including loss of revenue arising out of or allegedly attributable to the negligence, acts, errors, omissions, whether willful or otherwise by the City, their officers, employees, agents, or others who the City is legally responsible, in respect to this agreement. This indemnity shall be in addition to and not in lieu of any insurance to be provided to the Town in accordance with this agreement, and shall survive this agreement.

13. DEFINITION OF TERMS

a) Radio Communications Demarcation Point

The radio communications demarcation point defines the interface of the radio system components that are the responsibility of the United Counties of Leeds and Grenville, to the radio system components that are the responsibility of the City of Brockville. The United Counties of Leeds and Grenville is responsible up to and including the cable that plugs into the Motorola GGM8000 gateway WAN (Wide Area Network) Ethernet jack, while the City of Brockville is responsible for the GGM8000 gateway equipment and the equipment connected to the gateway LAN (Local Area Network) Ethernet jack.

b) NFPA

The National Fire Protection Association (NFPA) is a global nonprofit organization, established in 1896, devoted to eliminating death, injury, property and economic loss due to fire, electrical and related hazards. NFPA is widely known as a codes and standards organization for the Fire Service, as well as training and research.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

c) Population

The population for the United Counties of Leeds and Grenville is based on the most current Municipal Property Assessment Corporation (MPAC) population report.

14. NOTICE

Any notice, request, demand, consent, approval, correspondence, report or other communication required pursuant to or permitted under the Agreement must be in writing and must be given by personal delivery, or transmitted by fax, email or other electronic medium that provides a hard copy, or be sent by first class mail, postage or charges prepaid, and addressed to the party to whom it is intended at its address as set out below:

To the Corporation of the Town of Prescott:

Attention: Chief Administrative Officer
Town Of Prescott
P.O. Box 160, 360 Dibble Street West
Prescott, ON.
K0E

To The City of Brockville

Attention: City Manager
City of Brockville
Victoria Building
One King Street West
P.O. Box 5000
Brockville, Ontario K6V 7A5

Any such notice shall be deemed to be received, if personally delivered or sent by fax, email or other electronic medium, on the day it is sent and if such notice is sent by first class mail it shall be deemed to have been received on the date that is five (5) days after the date of mailing.

This notice applies solely to the terms and conditions of this agreement, and does not include regular communications between the Counties, the Fire Chiefs and Brockville Fire Department relating to regular operations outside of this agreement.

15. MISCELLANEOUS

- a) The Town of Prescott and The City Brockville agree to sign all such documents and do all such things as may be necessary or desirable to more completely and effectively carry out the terms and intention of the Agreement.
- b) This Agreement contains the entire agreement between the parties and supersedes any previous agreement in writing or otherwise made between the parties hereto with respect to the subject matter hereof.

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

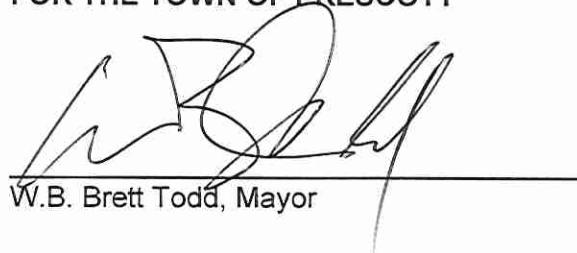
Furthermore, any conflict or difference in the wording of the attached proposal and this agreement, this agreement supersedes the proposal.

- c) Time shall be of the essence of this Agreement.
- d) If any provision of this Agreement is found to be invalid or unenforceable, it shall be severed from the Agreement without affecting the validity or enforceability of the remaining portions of this Agreement.
- e) Both parties named in this Agreement mutually agrees to indemnify each other from and against any third party liability that may arise out of the services set out in this Agreement.
- f) This Agreement shall ensure to the benefit of and be binding upon the respective successors and permitted assigns of the parties hereto.

IN WITNESS WHEREOF the Parties hereto affix their Corporate Seals and the signature of their proper signing officers in that behalf

SIGNED, SEALED AND DELIVERED

FOR THE TOWN OF PRESCOTT



W.B. Brett Todd, Mayor



Kimberley Casselman, Director of
Administration/Clerk

FOR THE CORPORATION OF THE CITY OF BROCKVILLE



David Henderson, Mayor



Sandra MacDonald, Clerk

*Fire Dispatch Services Agreement
Between The Town of Prescott and the City of Brockville*

SCHEDULE B

The fee structure is based on a per capita cost, based on a population of 64,640, as defined by the three (3) options listed as follows:

Option 1: Two dispatchers per shift,

Option 2: Two dispatchers per shift for 12 hours on daytime seven days a week, and one dispatcher on nights, plus up staffing during any major incident and known event,

Option 3: One dispatcher per shift plus up staffing during any major incident and known event, based on existing call volume.

Below are the per capita costs for each option, for each year of the 5 year agreement.

YEAR	OPTION 1		OPTION 2		OPTION 3	
	Per Cap	Total	Per Cap	Total	Per Cap	Total
2017	\$ 5.92	\$ 25,361	\$ 5.03	\$ 21,549	\$ 4.14	\$ 17,736
2018	\$ 6.16	\$ 26,389	\$ 5.23	\$ 22,405	\$ 4.31	\$ 18,464
2019	\$ 6.40	\$ 27,418	\$ 5.44	\$ 23,304	\$ 4.48	\$ 19,192
2020	\$ 6.66	\$ 28,531	\$ 5.66	\$ 24,247	\$ 4.66	\$ 19,963
2021	\$ 6.93	\$ 29,688	\$ 5.88	\$ 25,190	\$ 4.84	\$ 20,735

The above per capita total costs are based on a population of 4,284.

JANUARY 9, 2018

REPORT TO FINANCE, ADMIN. & OPERATIONS COMMITTEE – JAN. 16, 2018

2018-009-01

**ONTARIO MUNICIPAL COMMUTER
CYCLING PROGRAM**

**C.J. COSGROVE, P.ENG
DIRECTOR OF OPERATIONS**

RECOMMENDED

THAT Council authorize the Mayor and City Manager to enter into a Transfer Payment Agreement with Her Majesty the Queen in Right of Ontario as represented by the Minister of Transportation for the Province of Ontario for the Ontario Municipal Commuter Cycling Program.

PURPOSE

The Ministry of Transportation requires a resolution of Council authorizing the execution of the Transfer Payment Agreement for funding through the Ontario Municipal Commuter Cycling Program (OMCCP).

BACKGROUND

At the July 25, 2017 meeting, Council authorized an application to the OMCCP for funding of an active transportation plan that includes cycling (Attachment 1).

ANALYSIS

The province is proposing to provide \$48,000 towards the estimated cost of \$60,000 to complete an active transportation plan. In addition, the province is proposing to provide \$135,361.96 towards the estimated cost of \$201,000 for the Brock Trail Project included in the 2018 Capital Budget (Railway Tunnel to Front Avenue).

POLICY IMPLICATIONS

There are no policy implications.

2018-009-01

Ontario Municipal Commuter Cycling Program

Page 2

FINANCIAL CONSIDERATIONS

The 2018 Capital Budget allocation for the Cycling Network (\$15,000) provides sufficient funds for the City's share of the active transportation plan. The 2018 Capital Budget allocation for the Brock Trail (\$67,000) provides sufficient funds for the City's share of that project.

CONCLUSION

The City should enter into the Transfer Payment Agreement in order to receive funding through the OMCCP.



C.J. Cosgrove, P.Eng.
Director of Operations



D. Dick, CPA, CA
Director of Corporate Services

B. Casselman
City Manager

City of Brockville
Council Meeting Minutes - Tuesday, July 25, 2017

**3. 2017-081-07
Ontario Municipal Commuter Cycling Program**

THAT the City of Brockville apply to the Ontario Municipal Commuter Cycling Program for funding of an active transportation plan that incorporates cycling.

**4. 2017-083-07
2017 Departmental Work Plans
2nd Quarter Report**

THAT Council approve the 2017 Departmental Work Plans Second Quarter Report as outlined in Schedule 1, Report 2017-083-07.

**5. 2017-075-07
Tiered Response Agreement
United Counties Leeds & Grenville and City of Brockville**

THAT Council authorizes the Mayor and Clerk to execute the Tiered Response Agreement between the United Counties of Leeds and Grenville EMS and the City of Brockville.

**6. 2017-076-07
Fire Communication Agreement
Municipality of South Dundas**

THAT Council authorizes the Mayor and Clerk to execute a Fire Dispatch Communication Service Agreement between the City of Brockville and the Municipality of South Dundas for the period of five years commencing on January 1st, 2017 and ending on December 31st, 2021.

**7. 2017-084-07
Donation of 1997 Pierce Quantum Pumper Rescue to
St. Lawrence College**

THAT Council authorizes the donation of a surplus 1997 Pierce Quantum Pumper Rescue to the St-Lawrence College Brockville Campus to be used for its Firefighter Pre-Service Program.

JULY 10, 2017

REPORT TO FINANCE, ADMIN. & OPERATIONS COMMITTEE – JULY 18, 2017

**2017-081-07
ONTARIO MUNICIPAL COMMUTER
CYCLING PROGRAM**

**C.J. COSGROVE, P.ENG
DIRECTOR OF OPERATIONS**

RECOMMENDED

THAT the City of Brockville apply to the Ontario Municipal Commuter Cycling Program for funding of an active transportation plan that incorporates cycling.

PURPOSE

The purpose of this report is to introduce the Ontario Municipal Commuter Cycling Program (O.M.C.C.P.), and how it can assist in achieving the City's goals with respect to implementing a cycling network.

BACKGROUND

As part of the Ontario Cycling Strategy and Action Plan, the O.M.C.C.P. will provide direct, dedicated, annual funding to municipalities to support the implementation of commuter cycling infrastructure.

The O.M.C.C.P. is a four-year program (2017 – 2020), with \$42.5 million available in the first year. All Ontario municipalities are eligible for funding to support up to 80% of costs associated with the implementation of eligible projects.

ANALYSIS

For municipalities with a population greater than 15,000, allocations will be based upon a funding formula. The projects submitted by a municipality must be prioritized based on a Council-approved cycling plan. Where a municipality does not have a cycling plan to work from, they must first use the O.M.C.C.P. funding to develop a cycling plan.

The City was successful in obtaining \$325,000 through the Ontario Municipal Cycling Infrastructure Program, the predecessor of the O.M.C.C.P., towards the construction of two sections of the Brock Trail. The O.M.C.C.P. presents an opportunity to use Capital Budget allocations for the Brock Trail and the Cycling Network to leverage provincial funds towards expanding the Brock Trail and creating a true cycling network, as envisaged in the City's

2017-081-07
ONTARIO MUNICIPAL COMMUTER CYCLING PROGRAM

Page 2

Official Plan.

The Brockville Cycling Advisory Committee has done significant work towards developing a cycling network. The O.M.C.C.P. presents an opportunity to have transportation professionals review, refine and expand on the work done to date and conduct additional public consultation before recommending a cycling plan for adoption by Council. It is recommended that the cycling plan be developed as part of an active transportation plan, as in many cases it is anticipated that cyclists and pedestrians will be sharing the same facilities, especially the Brock Trail. An active transportation plan would focus on integrating cyclists, pedestrians and other "people-powered" modes of transportation such as skateboards and rollerblades, into the City's transportation system.

POLICY IMPLICATIONS

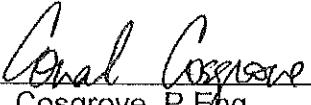
Council endorsement is a requirement of the application process.

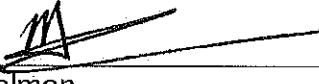
FINANCIAL ANALYSIS

In 2014, Council endorsed a 10 year capital plan for active transportation projects. This plan has been embedded in the City's Capital Plan. The existing allocations for the Cycling Network and the Brock Trail can provide the funds required to match the funding available through the O.M.C.C.P. for an active transportation plan that can be expected to cost in the range of \$40,000 to \$60,000. Assuming 80% funding from the O.M.C.C.P., the City share would be \$8,000 to \$12,000. There is an allocation of \$15,000 annually in the Capital Budget for the Cycling Network.

CONCLUSION

The City of Brockville should apply to the O.M.C.C.P. for funding for an active transportation plan.


C.J. Cosgrove, P.Eng.
Director of Operations


B. Casselman
City Manager


D. Dick, CPA, CA
Director of Corporate Services

JANUARY 9, 2018

REPORT TO FINANCE, ADMIN. & OPERATIONS COMMITTEE – JAN. 16, 2018

2018-008-01

**LEASE OF CABOOSE -
ESCAPE ROOM**

**C.J. COSGROVE, P.ENG
DIRECTOR OF OPERATIONS**

RECOMMENDED

THAT the City of Brockville enter into a lease with Ottawa Tasting Tours for the use of the caboose in Armagh S. Price Park as an "Escape Room".

PURPOSE

The purpose of this report is to authorize the use of the caboose located in Armagh S. Price Park as an "Escape Room".

BACKGROUND

The Museum Board, who previously had responsibility for the maintenance of the caboose, requested that the City, through the Railway Tunnel Committee, assume responsibility for the caboose.

The Railway Tunnel Committee discussed options for more directly integrating the caboose with the Railway Tunnel attraction.

ANALYSIS

The Railway Tunnel Committee received a proposal from Ottawa Tasting Tours, a Brockville based business (www.ottawatastingtours.com) to operate an "Escape Room" in the caboose. The Committee is supportive of the idea to create a complementary attraction to the Railway Tunnel, and to generate revenue for tunnel operations, subject to conditions which are included in the proposed lease.

The terms of the lease include:

- Duration
January 2018 to March 31, 2021 with a mutual 30 day termination clause.
- Compensation
\$500 per month, plus 5% of the monthly gross revenue, with the total monthly payment not to exceed \$1,000 per month. Compensation for the second and third year to be determined based on the success of year one.

- Interior Renovations
At the Operator's cost, including a requirement to restore the caboose to its current configuration at the termination of the agreement.
- Hours of Operations
The Escape Room will not operate outside of the hours between 9 a.m. and 9 p.m.
- Insurance
As recommended by the City's insurer.
- Indemnification
As recommended by the City's insurer.

POLICY IMPLICATIONS

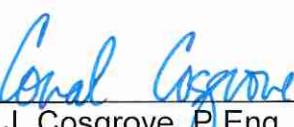
Council authorization is required to lease City property.

FINANCIAL CONSIDERATIONS

The lease would generate a minimum revenue of \$6,000 from April 1, 2018 to March 31, 2019.

CONCLUSION

The caboose should be leased to Ottawa Tasting Tours for the operation of an "Escape Room".


C.J. Cosgrove, P.Eng.
Director of Operations


D. Dick, CPA, CA
Director of Corporate Services


B. Casselman
City Manager

NOVEMBER 28, 2017

REPORT TO COUNCIL – DECEMBER 5, 2017

2017-122-12

2016-2017 MASTER FIRE PLAN

G. PIGEON, FIRE CHIEF

R. RAYNER, DEPUTY FIRE CHIEF

T. GERVAIS, TRAINING & CONSULTING COORDINATOR-LOOMEX GROUP

RECOMMENDED

THAT Council adopt in principle the City of Brockville 2016-2017 Master Fire Plan as presented by the Fire Department Administration in conjunction and with the assistance of consultants Chris Powers and Terry Gervais.

PURPOSE

The purpose of the Master Fire Plan is to assist Council and the Fire Department Administration in making current and future decisions regarding the Brockville Fire Service so that it may continue to serve the community effectively as the municipality moves forward in coming years.

The Master Fire Plan is intended to review all aspects of the Brockville Fire Department and consider how the services and resources available align with the demands for service and risks present in the City.

BACKGROUND

In 2016, under the direction of Council and City Administration, the Brockville Fire Department assumed the project of creating a Master Fire Plan. The Fire Department Administration met with key stakeholders to review five years of statistics and the operations of the divisions within the Brockville Fire Department.

The document contains information on the history of the department and establishes where we are today and provides a clear path for the future.

ANALYSIS/OPTIONS

The Master Fire Plan reviews each primary function of the fire service and also the interaction with other municipal departments. Each section of the report reviews factors and specific fire department operations, some of the changes that have taken place and makes recommendations for any identified additional change or improvement. Not all sections have recommendations. All recommendations are summarized at the end of the document for quick reference.

POLICY IMPLICATIONS

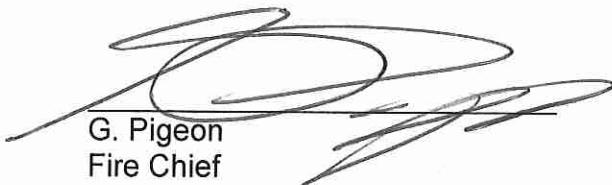
A number of the recommendations could have policy implications and will be brought back to Council individually for review and approval.

FINANCIAL CONSIDERATIONS

There are currently no financial considerations, the financial considerations and financial impact will be identified as recommendations are brought forward through the budget process in years to come. Many of the recommendations have no direct financial impact, but will allow the department to operate in a more efficient manner.

CONCLUSION

The Master Fire Plan is intended to assist Council and the Fire Department Administration in making current and future decisions regarding the Brockville Fire Service so that it may continue to serve the community effectively as the municipality moves forward in coming years. We are recommending that it be adopted in principle.



G. Pigeon
Fire Chief

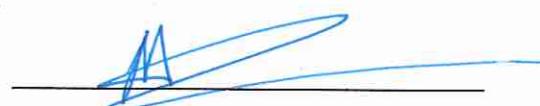


R. Rayner
Deputy Fire Chief





D. Dick, CPA, CA
Director of Corporate Services



B. Casselman
City Manager



 **BROCKVILLE**
CITY OF THE 1000 ISLANDS

2016-2017 MASTER FIRE PLAN

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Executive Summary

This Master Fire Plan is intended to assist Council and the Fire Department Administration in making current and future decisions regarding the Brockville Fire Service so that it may continue to serve the community effectively as the municipality moves forward in coming years. There are many factors to consider in developing a Master Fire Plan, and no two municipalities or fire departments are the same. Differences in community make up, economic conditions, population, fire and emergency service delivery and capabilities vary considerably.

The City of Brockville is faced with ongoing challenges that many municipalities in Ontario are trying to address to provide efficient and effective municipal services at an affordable cost. The economic circumstances have caused significant changes in the Ontario economy. Industrial and commercial activities are being negatively impacted, resulting in loss of employment and tax base as the sectors downsize or close facilities. The shift in tax burden from those sectors to the residential sector has increased pressure to constrain costs and tax increases. At the same time, public sector wages continue to increase at a greater rate than many in the private sector; operational costs including a significant escalation in hydro rates, purchase of supplies and materials as well as capital items have all increased.

Emergency Services are considered an essential service. The Police and Fire Departments are frequently the largest costs in municipal budgets as they require staffing twenty-four hours a day, seven days a week, three hundred sixty-five days a year. The nature of Emergency Services work that can place workers safety and lives at risk has resulted in typically higher salaries than those in other service type occupations. Collective agreements for unionized police and fire members are most often driven by settlements in large urban centers such as Toronto and Ottawa or from provincial agreements. These factors combine to create financial pressures that most municipalities find extremely difficult to fund.

The City of Brockville hasn't seen significant growth since the development of the area north of Highway 401 in the 1980's and there is a limited capacity for future growth within the current municipal boundaries. The old downtown buildings represent a very challenging risk to preventing and suppressing fires. The frequency of structural fires has decreased in recent years but the potential for a serious multi-building fire remains a primary concern.

The Master Fire Plan is intended to review all aspects of the Brockville Fire Department and consider how the services and resources available align with the demands for service and risks present in the City. Unfortunately, there is no easy solution that can both reduce costs meaningfully while maintaining sufficient capacity to protect the residents and property from fires and other emergency situations. There are opportunities to adjust and revise components of the Brockville Fire Department that can improve effectiveness and cost efficiencies. The department will make recommendations to Council with regards to changes in policies that can increase cost recovery, reduce operating expenses, and find new ways of conducting business.

Introduction

The purpose of the Master Fire Plan is to provide a framework for Council and the Fire Department Administration to make policy, organizational, capital and operational decisions affecting the Brockville Fire Department for both the short-term (one to three years) and long-term. The Master Fire Plan is based on the requirements of the *Fire Protection and Prevention Act* and other regulations and standards including the *Occupational Health and Safety Act, Section 21 Guidance Notes, National Fire Protection Standards* and the *Fire Underwriters Survey*.

The *Fire Protection and Prevention Act, 1997 (FPPA)* identify the responsibility for fire protection services as follows:

Subsection 2.(1) Municipal Responsibilities

Subsection 2.(1)

"Every municipality shall,

1. establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and
2. provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances."

Furthermore, the *Fire Protection Prevention Act* also defines the relationship of the Fire Chief to Council as follows:

Responsibility to Council

(3) A fire chief is the person who is ultimately responsible to the council of a municipality that appointed him or her for the delivery of fire protection services.

Council is the body that determines the types and levels of fire protection services that will be provided. The Fire Chief, as the person responsible to deliver those services, makes recommendations to council that he/she believes are required to meet the needs of the community and to comply with standards and regulations. The recommendations in the Master Fire Plan are those of the Fire Department Administration with observations from the Consultant. The Consultant provides comments or suggestions on issues that may or may not be supported by the Fire Department Administration; those issues may require additional study and consideration.

The residents and Council expect that the fire service will be run in an effective and efficient manner and also need to know the capabilities and limitations of the fire service given the resources provided. This report will consider current and future resource needs to provide the services authorized and identify benchmarks to measure service efficiencies.

This report reviews each primary function of the fire service and also the interaction with other municipal departments. Each section of the report reviews factors and specific fire department operations, some of the changes that have taken place and makes recommendations for any identified additional change or improvement. Not all sections have recommendations.

All recommendations are summarized on pages 69-72 for quick reference.

Overview of the City of Brockville

The City of Brockville is located in Eastern Ontario in the Thousand Islands Region. Brockville is a single – tier or “separated municipality”. While it is the seat of the United Counties of Leeds and Grenville, it is politically independent of the county. Known as the "City of the 1000 Islands", Brockville is located on the north shore of the St. Lawrence River opposite Morristown, New York and about halfway between Cornwall (East) and Kingston (West). It is just over 100 km south of the National Capital Region, Ottawa-Gatineau. Brockville is bordered on the east, north and west by Elizabethtown – Kitley Township and on the south by the St. Lawrence River.

The first settlement of the area began in 1784 upon the arrival of United Empire Loyalist following the American War of Independence. Formerly known as Elizabethtown, it was selected as the location for the District of Johnstown Court House and Gaol in 1808. In January 1832 the Provincial Legislative Council passed the *Brockville Police Bill* authorizing a board of police to pass by-laws and raise levies for local purposes. Brockville was the first municipality in Ontario to gain this autonomy from township, county or provincial authority.

The City is well served by transportation infrastructure with Highway 401 and the mainline of Canadian National Railway between Montreal and Toronto. Via Rail provides daily passenger services. The waterfront in the early years was an important port for shipping of lumber and other products with a rail tunnel providing access to the docks. This area is now an important tourist attraction. The City also operates a municipal airport with a paved runway of 4500 feet, located north of the city in Elizabethtown – Kitley Township.



In 2016, Brockville (City) had a population of 21,346, representing a percentage change of -2.4% from 2011. This compares to the national average growth of 5.0%. Land area is 20.85 square kilometers with a population density of 1,023.6 persons per square kilometer. In 2016, Brockville (City) had 10,266 private dwellings occupied by usual residents.

**Source: Statistics Canada
2016 Census**

The City of Brockville also owns and operates sixteen small islands in the St. Lawrence River, some of which have docking and campgrounds available for tourist in the summer

Growth and Development

The City is composed of two distinct development areas. The area south of the Highway 401/Canadian National Railway is primarily the historic district with development dating from the 1800's. The area north of the rail line and Highway 401 is more typical of contemporary suburban development with residential, commercial, and industrial districts.

Brockville has many positive attributes including location, transportation, good local services and infrastructure to attract investment and growth, however, the current economic climate has presented challenges to growth in both the residential and commercial/industrial sectors. The City has approximately seven million square feet of industrial space including a number of multi-national companies. During the peak, local industry employed approximately five thousand one hundred people; currently industry employs approximately three thousand seven hundred people. The City of Brockville, like many Ontario Cities, has seen a significant loss of manufacturing jobs since 2008, this trend impacts population growth and residential development.

The Economic Development and Tourism Department has worked to retain existing employers while growing and diversifying new investment opportunities. The growth of tourism is one of the components of this diversification effort along with the major effort to attract medium to large scale employers.

In recent years the burden of taxation has shifted to the residential sector from the commercial/industrial sector creating increased pressure on budgets and the need to limit tax increases.

Some communities in/or adjacent to the Great Toronto Area (GTA) or Ottawa are benefiting from the demand for housing and the added revenue from development charges and property taxes. Brockville has limited land available for additional growth, and population projections in the official plan reflect only small changes in the future and may have to be revised based on recent census data.

Downtown and Waterfront

The old downtown and waterfront are key destinations for tourism with attractions such as The Aquatarium, The Brockville Tall Ships Festival, Blockhouse Island, Tour Boat cruising in the 1000 Islands, and marinas for pleasure craft. The many historic buildings in the downtown area dating from the 1800's represent a period of important growth. The many victorian homes, as well as the public and commercial buildings with architectural design and craftsmanship create a character and environment with many positive attributes. Development of the historic Railway Tunnel as a tourist attraction is now open.



North End of the City

The development north of Highway 401 has significant commercial shopping and retail services along Parkedale Avenue. Industrial facilities are located both adjacent to Highway 401 and in the industrial park in the northeast corner, including major employers such as Proctor and Gamble, 3M Canada, Shell Canada, Trillium Health Care and many others. Various warehousing and transport companies provide supply chain services. The Brockville campus of St. Lawrence College is also located here and has an enrollment of some seven hundred sixty students per year.



Fire Service in Brockville

History of the Brockville Fire Department

Over the centuries the danger of fire has always been a significant concern as communities develop. Fires in the 1800's and 1900's were common and difficult to prevent or control with limited firefighting capacity often depending on the "bucket-brigade" of local inhabitants.

The Brockville Board of Police was formed in 1832; one of their first priorities was to address the need for a fire brigade. The following information provides an understanding of how the Brockville Fire Department began:¹

7 April 1832 — The *Brockville Board of Police* decided at their second meeting to purchase a **fire engine** for a sum not to exceed £125. Then, the first town officers were appointed.

9 April 1832 — The Police Board established the **first volunteer Fire Company** to consist of a captain and forty-eight persons who would provide themselves with a proper fireman's uniform at their own expense.

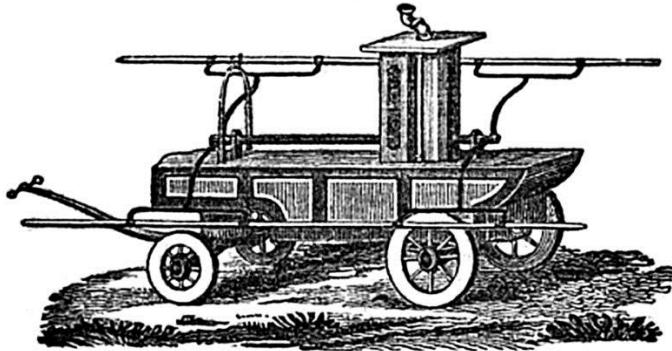
¹ Source: Brockville History Album, Doug Grant, <https://brockvillehistoryalbum.wordpress.com/>

12 February 1833 — Stephen Richards, a local blacksmith, was hired to proceed to Brattleborough, Vermont, or any other location, in search of a fire engine for the town, which might cost up to £150.

4 March 1833 — Stephen Richards made a report to the Police Board recommending a large “**Rogers’ Patent**” **fire engine**, designed for twenty-four men and discharging two hundred gallons of water per minute.

6 April 1833 — William Hervey was appointed **Captain** of the Fire Company. Tenders were requested for the building of a wood-framed Fire Engine House.

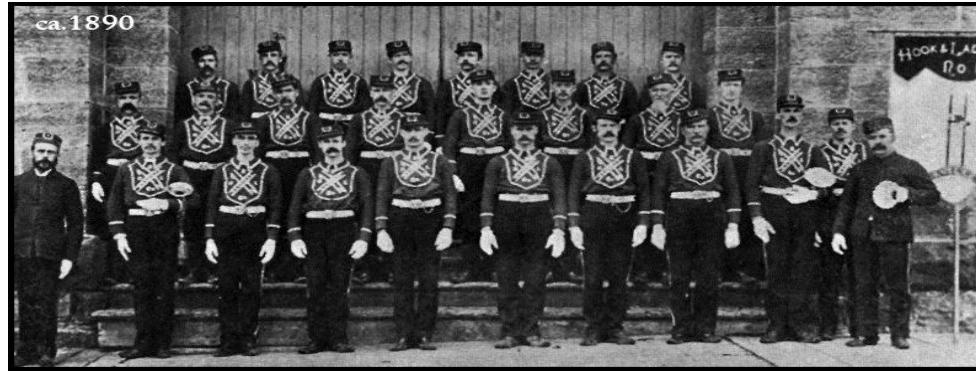
27 April 1833 – The Police Board approved a drawing and specifications for the **Fire Engine House** provided by **Francis Hacket**, a house carpenter, and to cost £22.



A typical hand-pumped Fire Engine, as made by the John F. Rogers Company of Waterford, New York – This was the design known as the “Rogers’ Patent” and was produced in the early 1830s.

In addition to “Engine Companies” who pumped water, there were “Hose Companies” that brought reels with fire hose to the scene and “Hook and Ladder Companies” that raised ladders for rescue and access to upper stories, and opened walls for fire streams to attack the fire.

The first fire brigades were all volunteers with members from various walks of life as shown in this photo which lists names and some of the occupations of the volunteers.



Brockville Volunteer Hook & Ladder Company No.1 — ca.1890

Back Row: (from left) Patrick S. Roberts (railwayman), John York, William J. Reynolds, John L. Upham (bookseller), James Connors (moulder), W. Kelly, James H. Stewart (butcher), W. Ezra Amond (labourer)

Middle Row: (from left) John Woods, Henry Mathen (boat livery), Michael Collins (machinist), William Mathen, D. Brady, John Flanigan, James H. Hall (carter), George K. Dewey (tax collector)

Front Row: (from left) John R. Reid, Henry Jennings, J. Owens, Thomas Miller (moulder), William Dodd, James S. Dodds, Joshua E. Timlick (machinist), John Botham (packer), William McKay, Thomas Nicol, William H. Harrison (stoves)

As the town grew, it became necessary to change how the fire brigade operated and increase the capacity of the equipment. Horses were then used to pull larger apparatus and steam pumbers replaced manual pumps. Full-time firefighters were required to care for the horses and equipment, and that, along with the demand for a more dependable response to fires, gave rise to the beginning of full-time firefighters who were supported by the volunteers. Insurance costs and the evaluation of firefighting capacity was an important factor in improving fire protection in towns and cities.

Over the years the Brockville Fire Department continued to evolve and improve. In 1910 a new fire station was constructed on Perth Street and remained the headquarters and the only fire station in the city until a new station was constructed in 1990. Fire Station No.2 was built to serve the north end of the city as more development occurred and the level of service required could not be provided by the downtown station.



Brockville Fire Station No.1 at 61 Perth Street/James Street West built in 1910. This Photo shows the beginning of the transition from horse drawn to motorized apparatus.

The Brockville Fire Department Today

Establishing and Regulating By-law

The Brockville Fire Department provides fire protection and other emergency services to the City of Brockville. The department operates under the authority of Establishing and Regulating By-law No 012-87. This by-law identifies the general organization and operation of the department and responsibilities of members. The by-law should recognize the services that are currently being provided by the department.

Under the Fire Prevention and Protection Act (FPPA) municipalities with fire departments are mandated to provide the following fire prevention and public education services in addition to fire suppression:

- Simplified Risk Assessment
- Smoke Alarm Program
- Distribution of Fire Safety Materials
- Inspections upon complaint and request

The Brockville Fire Department is guided in its operations based on provincial legislation, industry standards, municipal by-laws and policies. The following is a list of the main legislation and standards:

- Fire Prevention and Protection Act (FPPA)
- Fire Marshal's Directives
- Emergency Management & Civil Protection Act (EMCPA)
- Ontario Building & Fire Codes
- National Fire Protection Association (NFPA) Standards
- Occupational Health & Safety Act (OH&S) and Section 21 Committee Guidelines
- Municipal By-laws
- Corporate Policies and Guidelines
- Department Policies and Standard Operating Guidelines

The Brockville Fire Department provides a variety of services. The services are provided in accordance with the level of training and resources available. These services are:

- Fire Prevention and Public Education
- Code enforcement
- Structural firefighting including rescue and interior fire attack
- Ice and water rescue – level II water entry
- Vehicle firefighting
- Grass, brush and forest firefighting
- Advanced medical assist with defibrillation
- Vehicle accidents
- High angle rescue (Operations Level)
- Vehicle extrication
- Transportation accidents
- Public assist calls
- Mutual aid and fire protection agreements
- Community Emergency Plan

The Brockville Fire Department also provides other limited services at an "Awareness" level. Only limited active intervention is possible at this level and requires assistance from fire services that are trained and/or equipped to deliver an advanced level of these special services. Services at an "Awareness level" or similarly limited in scope are:

- Hazardous materials response
- Confined space rescue
- Trench rescue
- City Islands – Cooperative Effort

The department also participates in a "Tiered Medical Response" program with the Leeds and Grenville Paramedic Service (EMS). The Tiered Response Agreement is currently under review.

The current Establishing and Regulating By-law 012-87 needs to be revised to reflect changes in legislation, liability and services provided.

Municipal Liability – Policy vs. Operational Decisions for Fire Protection

In the 1989 case of Laurentide Motel vs. Beauport (City)², the Supreme Court of Canada (SCC) found that the City of Beauport, Quebec, was liable for a major portion of the fire loss at the Laurentide Motel which occurred in 1972. This case was precedent setting in that until this time municipalities and fire departments were considered to be largely free from civil liability for firefighting efforts. An important aspect was the issue of "Policy Decisions vs. Operational Decisions" in determining liability. When the Supreme Court of Canada's decision was announced in 1989, the cost to the City of Beauport was over five hundred thousand plus interest.

"A client's negligence led to a fire that damaged appellants' hotel complex in the city of Beauport. As soon as they arrived, the firefighters sprayed water from the fire truck onto the fire, but the water soon ran out owing to the impossibility of connecting with the hydrants. The latter, which were difficult to reach and covered with snow, were unusable because they were frozen or broken. It was not until some forty minutes later that water was finally obtained from the hydrants. The appellants brought an action for damages against the person who had set the fire and the respondent, alleging fault by the latter in fighting the fire, namely that its equipment had not been maintained and did not function properly, as well as fault by its employees in the performance of their duties."

A summary of this case is included as an important consideration when council is making decision on fire protection services. Both water supply and negligence in firefighting operations were issues.

There is no question that a client in the motel was responsible for causing the fire, however, the failure of the City to maintain and operate effective fire protection services (water supply and firefighting) resulted in the City being held in part responsible, and allocated the majority of the costs. In the ruling, the court determined that a "Policy Decision" made by Council would be largely free from liability as it was made by an elected body in a manner

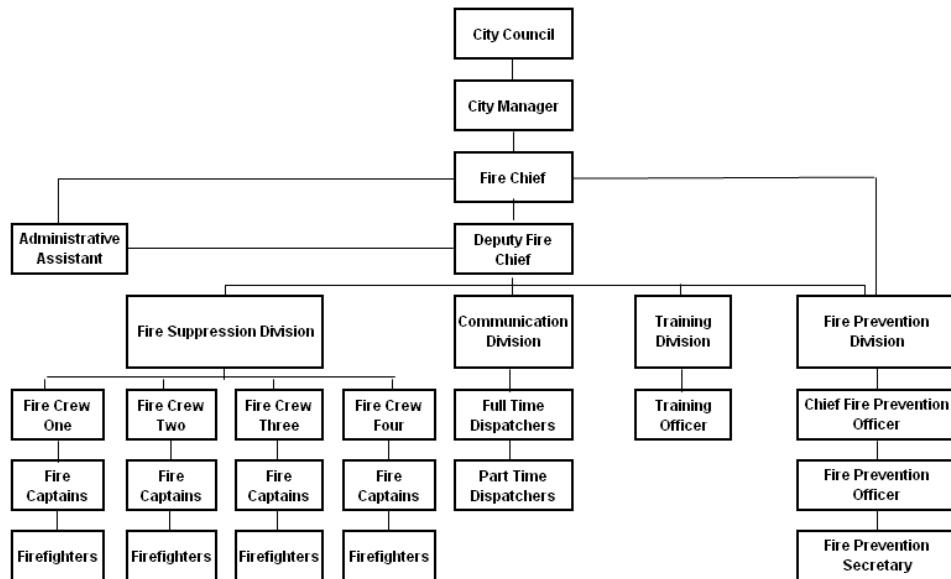
² Judgements of the Supreme Court of Canada - Laurentide Motel vs. Beauport (City) <http://scc-csc.lexum.com/scc-csc/scc-csc/en/item/436/index.do>

that the citizens would be aware of (by-laws, council minutes, news reports etc.). If the citizens were unhappy with the decisions of Council they had the opportunity to elect different councilors at the next election. With "Operational Decisions" made by departments/employees the public may not have knowledge of those decisions and have limited or no opportunity to question or change the decisions, which could adversely affect them.

As a result of this Supreme Court decision many municipalities have revised and updated by-laws relating to fire protection. This ensures services and policies are included as a decision of Council and not as "operational decisions" of the fire department. These by-laws include the Establishing and Regulating By-law specifying services provided and the level of service, fire prevention by-laws including open burning, false alarm, fireworks, fire routes and service agreements such as Mutual Aid and Automatic Aid.

Fire Service Management and Administration

BROCKVILLE FIRE DEPARTMENT ORGANIZATION CHART



The Brockville Fire Department is considered a "full-time fire department" with the following staffing: Fire Chief, Deputy Chief, Administrative Coordinator, Training Officer, Chief Fire Prevention Officer, Fire Prevention Officer, and Fire Prevention Secretary. Twenty-eight Fire Suppression Personnel including eight Captains, four Full-Time Dispatchers and three Part-Time Dispatchers.

Effective May 1, 2017 the Fire Prevention Secretary position has been eliminated on a trial basis and combined with the Administrative Coordinator position.

The duties of the Fire Chief and Deputy Chief are specified in the Establishing and Regulating By-law as well as in individual job descriptions. These officers, in carrying out their duties follow the direction of Council as well as responsibilities and obligations imposed by federal or provincial legislation on a variety of subject areas such as the Fire Protection and Prevention Act, Occupational Health and Safety Act, Emergency Management and Civil Protection Act, etc.

An important aspect of the management of the department is to continually review the operation of the department by assessing any need for change and evaluate community risks and the capacity to mitigate those risks through prevention, planning and response activities. Council should always be made aware of the results of those reviews and subsequent recommendations to address deficiencies or services provided.

The current fire chief started with the department in September 2015, and working with the deputy chief has been reviewing all aspects of the department. A number of initiatives have taken place and are ongoing to address areas of concern or opportunities that can improve the efficiency and operation of the department. Included in these initiatives is a new plan for the fire apparatus fleet to reduce costs, increase reliability and standardize the apparatus, also the relocation of the Fire Prevention and Fire Training Divisions from Station No.1 to Station No.2 that took place in early 2017 improved communication and interaction with the Fire Department Administration. They are also working on the provision of fire dispatch services to current clients and the possibility of adding other departments.

Standard Operating Guidelines (SOG's)

The standard for the operations of the department are contained in the department Standard Operating Guidelines (SOG's). The SOG's provide guidance and direction to members of the department so that they carry out their duties in accordance with standards and practices that comply with provincial legislation/regulations, as well as with municipal and department policies. This is necessary to ensure compliance with Council direction, establish consistent and effective work practices, and to meet the requirements of the Occupational Health and Safety Act and Regulations. At a minimum, a fire department should have an SOG for each topic identified by the Ministry of Labour Section 21 Guidance Notes (with a few exceptions where services/circumstances do not apply).

The Brockville Fire Department has a comprehensive set of SOG's covering various aspects of department operations. Brockville Fire Department SOG's are classified by Division/Subject Matter as follows:

- 211 - Firefighting Division with six sub-sections containing 57 SOG's
- 212 - Fire Prevention Division with thirteen SOG's
- 213 - Training Division with four SOG's
- 214 - Dispatch/Communications with a ninety-four page manual with approximately two hundred forty individual items

The majority of SOG's are dated from 2002 with some revisions in subsequent years. SOG's related to the Ministry of Labour Section 21 Guidance Notes are reviewed and updated by the training division annually to incorporate any new or revised guidance notes.

Mutual Aid and Automatic Aid Fire Protection Agreements

The department is authorized to participate in the Leeds and Grenville Fire Mutual Aid Agreement and other mutual aid agreements. Mutual aid is provided at no cost on a reciprocal basis for those occasional large fires that require additional resources and are beyond the ability of the department to contain without outside help.

An area of concern is that a municipality must not rely on mutual aid to provide adequate fire department resources for its anticipated or identified needs. This transfer of responsibility and costs to the neighboring municipality is not an acceptable means of providing basic fire department response resources. In these cases an automatic aid agreement should be considered as one option.

An automatic aid agreement is often provided with neighboring fire services to provide "first response" to some boundary areas or in other circumstances where local resources are lacking. Fire protection agreements are a valuable means of improving fire protection coverage in outlying portions of a municipality that are remote from the fire stations in that municipality. An agreement with a neighboring fire department to automatically respond to fire calls in the home municipality can reduce response time. It is more cost effective than attempting to build and staff additional fire stations that may have a minimal number of calls or a lack of volunteers available. These agreements are not considered a mutual aid agreement and usually include payment for services or compensation by reciprocal services.

Elizabethtown-Kitley Automatic Aid Agreement

Brockville presently has an Automatic Aid Agreement with Elizabethtown-Kitley to provide response to an area immediately east of the Brockville City limits. This area includes residential development and a number of facilities with vulnerable occupants including the Brockville Metal Health Centre with one hundred fifty-nine beds as well as three retirement residences - St. Lawrence Lodge, Sherwood Park, and Rosedale with a total capacity of over four hundred beds. Although these residences are not within the city limits, these four facilities probably represent the largest concentration of vulnerable occupants for which the Brockville Fire Department provides protection. There also are approximately two hundred eleven private dwellings and a number of commercial occupancies in the agreement area. Municipal water supply (hydrants) is available near the retirement residences and commercial occupancies but not for the private dwellings.

Elizabethtown-Kitley operates a volunteer fire department and service levels and costs are aligned with that level of fire protection. Brockville operates a full-time fire department with different service levels and costs. The agreement area in Elizabethtown-Kitley receives a different level of fire protection service than other areas in the Township.

Information on comparative costs for fire protection shows a significant disparity between Elizabethtown-Kitley and Brockville for fire protection. The Brockville Fire Department is not receiving anywhere near the appropriate cost recovery for its services in Elizabethtown and some means should be implemented in the budget to offset this deficiency in cost recovery. The following chart is 2015 FIR data provided by the Brockville Finance Department.

Fire Service Costs³	Elizabethtown	Brockville
Expenses	678,317	6,679,173
Revenues	41,494	77,040
Net	636,823	6,602,133
Households	4,068	10,794
Cost/Household	156.54	611.65
Population	9,724	21,870
Cost/Population	65.49	301.88
Assessment	1,015,644,737	2,066,057,510
Cost/\$100K assessment	62.70	319.55
Call Volume (from BFD monthly dispatch activations spreadsheet)	211	740

If the City of Brockville recovered full cost for fire protection from Elizabethtown-Kitley at an estimated two hundred eleven households it would result in revenue of one hundred twenty nine thousand vs. the current seven thousand five hundred. At one time the Brockville Mental Health Center had a separate contract with the City for fire protection at an annual fee of twenty two thousand. This fee was discontinued but Brockville still provides the service under the Elizabethtown-Kitley agreement. This represents a loss of potential revenue of approximately one hundred forty three thousand if both full cost recovery and the Mental Health Center contract amount are included.

Responses to Elizabethtown-Kitley average nineteen calls per year over the five years 2012–2016 with the majority of calls to the St. Lawrence Lodge and the Brockville Mental Health Centre.

With the limited number of on-duty firefighters in Brockville and the provisions in the present automatic aid agreement it does not appear to provide an equitable balance in terms of both the loss of fire protection available to Brockville when the fire department is committed to calls in Elizabethtown-Kitley or in the cost recovery for providing this service.

It is understood that there are a number of complicating factors in this relationship beyond the issue of providing fire protection, including the location of the Brockville Wastewater Treatment Plant in this area.

³ 2015 FIR data provided by Brockville Finance Department

A more detailed review of this issue is recommended to consider various options that could improve the agreement and continue providing response, while making provision for quickly arranging for fire protection coverage in Brockville when the on-duty crews are dispatched to Elizabethtown-Kitley, and also reflect the true cost of providing this service.

Fire Insurance Ratings

Fire insurance classifications for municipalities are set by the Fire Underwriters Survey as a guide to participating insurance companies in setting premium costs. Because the insurance business is competitive, rates will vary between companies even if they are using the same classification grading, however, residents and businesses can benefit financially overall if the premiums are lower because of a better classification.

Presently Brockville has a Public Fire Protection Classification of three, which is a very respectable grade and results in better fire insurance cost (premiums) than could be achieved with a lower service standard found in most municipalities protected by a volunteer fire department. The dwelling grade is a one, which is the best grading available for single family or duplex dwellings.

Explanation of the Grading Schedules

Public Fire Protection Classifications (PFPC)

Public Fire Protection Classification applies to commercial lines insured properties. This includes all properties that are not considered single family dwellings or duplex (This includes multifamily residential and farm operations).

Using the grading schedule model, major features and conditions in the community including water supply, fire department, fire service communications, fire prevention, and building code enforcement and conditions are evaluated. The evaluation of the fire defenses is expressed as a protection classification which is graded on a one to ten scale. The grading reflects the ability of the community to combat major fires that may be expected to occur in commercial, industrial, institutional and multi- family residential properties.

How the Public Fire Protection Classification Grading System Works:

The Public Fire Protection Classification Grading System looks at a community's fire risk and evaluates the capabilities of a fire department. The following is the criteria and the relative weight that is used to set the class.

- Fire risk, including analysis of required fire flows for individual buildings, building groups and zones of similar risk (Fire Flow Demand Zones) of the community
- Fire department, including apparatus, equipment, staffing, training, operations and geographic distribution of fire companies
- Water supply system, including source to distribution analysis, redundancy factors, condition and maintenance of various components, and storage volume
- Fire Prevention and Fire Safety Control programs including public education, codes/bylaws implementation and use of codes/bylaws in managing the level of fire risk throughout communities
- Emergency Communication systems, including telephone systems, telephone lines, staffing, and dispatching systems

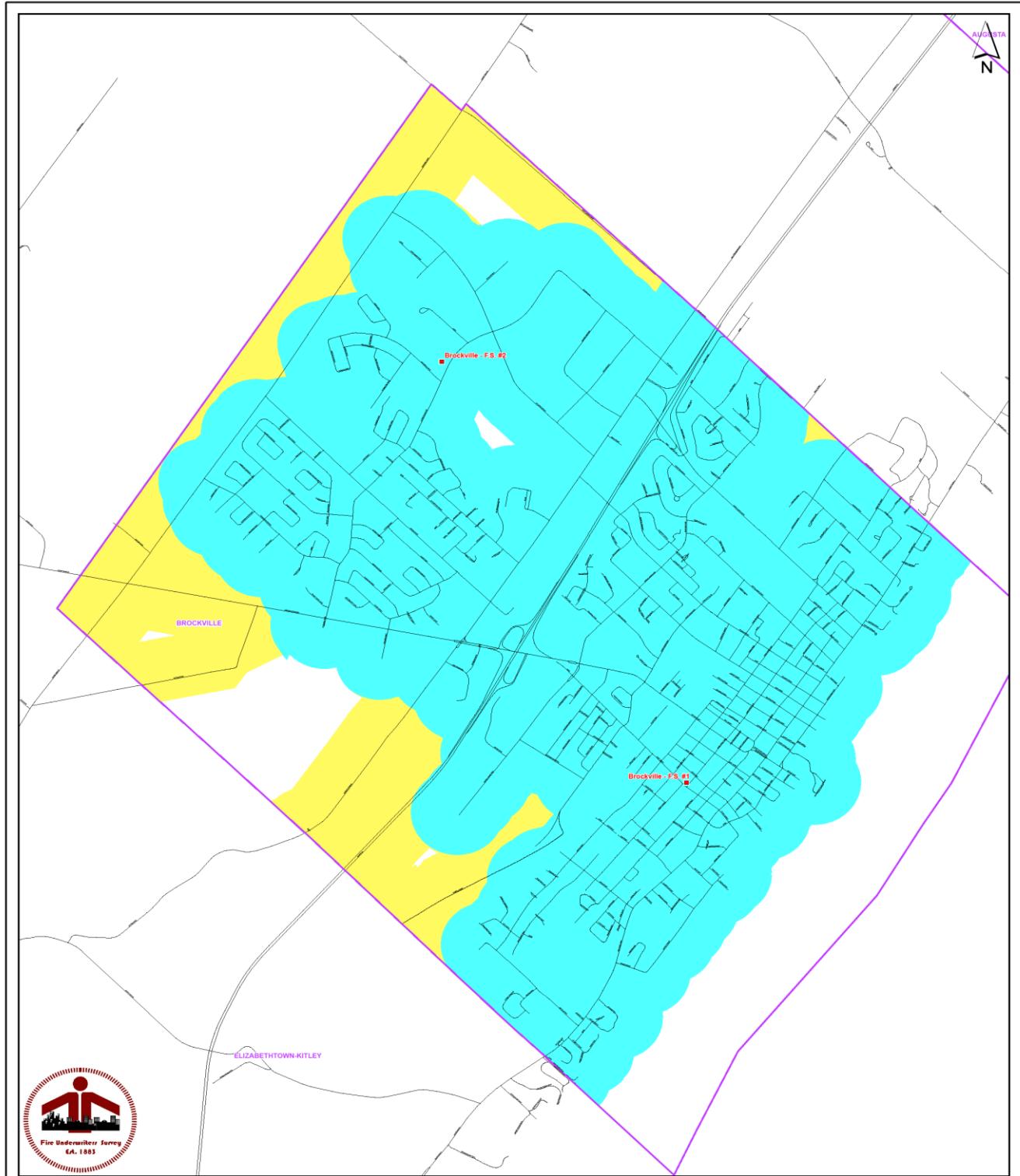
Feature	Relative Weight
Water Supply	30%
Fire Department	40%
Fire Safety Control	20%
Fire Service Communications	10%
Total	100%

Dwelling Protection Grades (DPG)

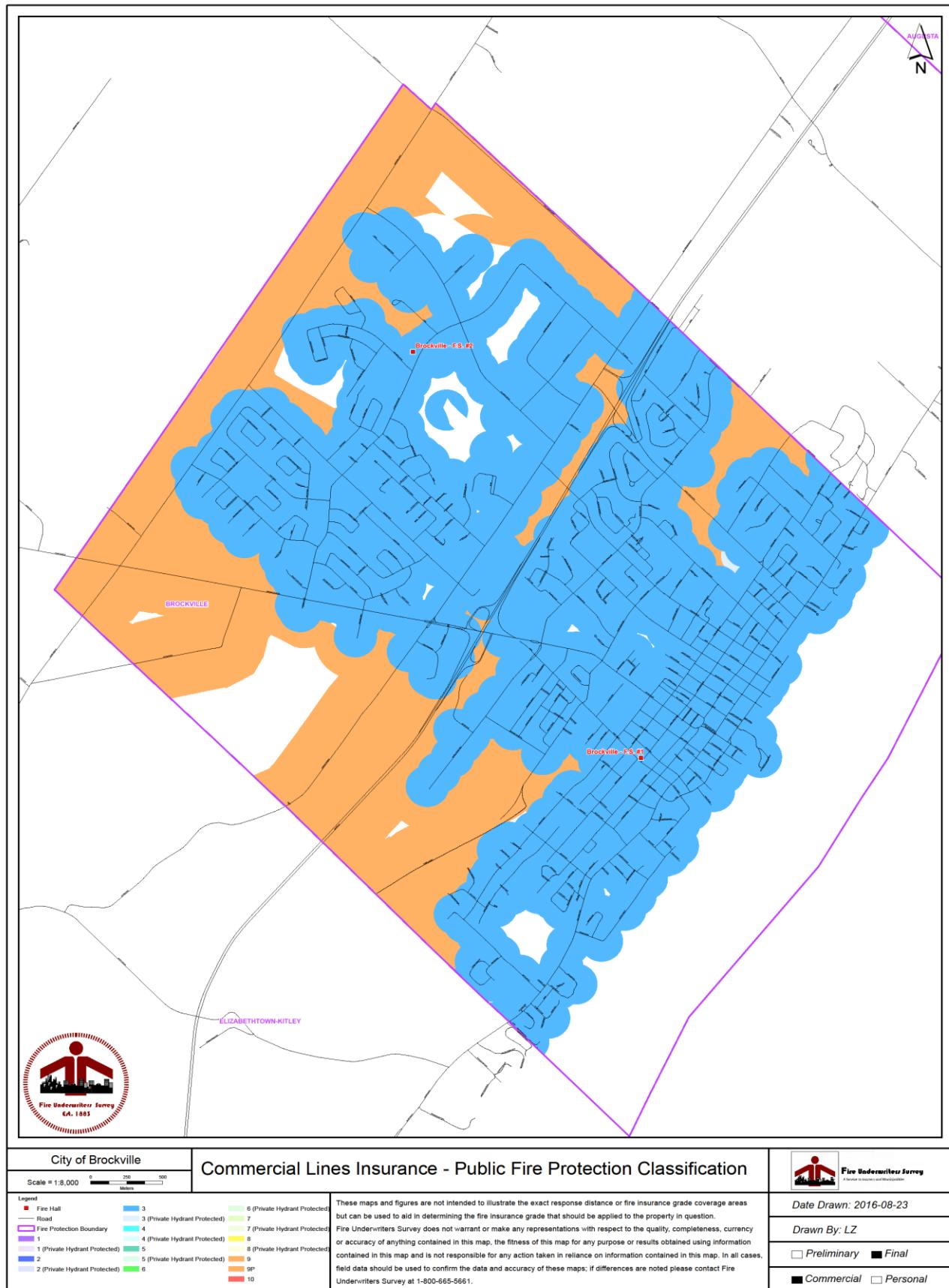
The Dwelling Protection Grade applies to personal lines insured properties. This includes all single family residences and duplexes.

Refer to the following table for the basic requirements under each of the five categories:

Minimum Dwelling Protection Grade (DPG) Requirements						
Criteria	DP					
	1	2	3A	3B	4	5
Water supply system equipped with standard hydrants capable of delivering a minimum 200 IGPM for 2-hour duration or 400 IGPM for a 1-hour minimum duration in addition to maximum consumption.	X	X	X			
Response from within 5 miles of a fully equipped standard triple combination pumper	X	X	X			
Response from within 5 miles of fully equipped standard triple combination pumper plus a tanker. Combined tank capacity must be at least 1500 imperial gallons and there must be a transfer system capable of supplying the pumped (dump valve, portable tank, portable pump etc.)				X		
Response from within 5 miles of a fully equipped standard triple combination pumper or tanker with minimum 800 imperial gallon tank and 200 IGPM pump (e.g. PTO)					X	
Adequate drafting sources. Locations to be clearly indicated on a map				X	X	
Minimum of 3 career firefighters on-duty (24 hours/day) with apparatus	X					
Minimum of 1 on-duty career firefighter (24 hours/day) backed by 15 volunteers per station		X				
Minimum of 15 volunteer firefighters per station			X	X		
Minimum of 10 volunteer firefighters per station						X
Means of alarm receipt and dispatch (pagers, siren, group phones, etc.)	X	X	X	X	X	
Heated and well maintained fire hall	X	X	X	X	X	
Regular training of all fire department members (weekly in case of volunteers)	X	X	X	X	X	
Clearly defined fire protected area with boundaries clearly indicated on map	X	X	X	X	X	



City of Brockville	Personal Lines Insurance - Dwelling Protection Grades		 Fire Underwriters Survey
Scale = 1:8,000	 Metres		
Legend <ul style="list-style-type: none"> ■ Fire Hall — Road ■ Fire Protection Boundary 1 2 (Private Hydrant Protected) 3A (Private Hydrant Protected) 3B(F) 3B(L) 3B(S) 4 5 			
<p>These maps and figures are not intended to illustrate the exact response distance or fire insurance grade coverage areas but can be used to aid in determining the fire insurance grade that should be applied to the property in question. Fire Underwriters Survey does not warrant or make any representations with respect to the quality, completeness, currency or accuracy of anything contained in this map, the fitness of this map for any purpose or results obtained using information contained in this map and is not responsible for any action taken in reliance on information contained in this map. In all cases, field data should be used to confirm the data and accuracy of these maps; if differences are noted please contact Fire Underwriters Survey at 1-800-665-5661.</p>			Date Drawn: 2016-08-23 Drawn By: LZ <input type="checkbox"/> Preliminary <input checked="" type="checkbox"/> Final <input type="checkbox"/> Commercial <input checked="" type="checkbox"/> Personal



RECOMMENDATIONS

1. It is recommended that the 1987 Establishing and Regulating By-law (012- 87) be updated to a more current version and include a list of Council authorized services for both emergency responses and fire prevention activities. It should also clarify levels of service delivery, as well as incorporate any changes in legislation/regulation (e.g. carbon monoxide detectors, mandatory inspection of vulnerable occupancies, etc.)
2. It is recommended that a procedure be developed to review and update/rescind or develop new Standard Operating Guidelines (SOG's) to ensure they reflect current policies and Council direction as well the FPPA, OH&S and other legislation that may apply.
3. It is recommended that the Fire Department provide an Annual Report to Council to detail the activities and work of the department and identify benchmarks for key activities.
4. It is recommended that the City request a new Fire Protection Survey be conducted by the Fire Underwriters Survey (FUS) to update the current grading schedule and provide information on the potential financial impact of various classification changes to residents and businesses in Brockville.
5. It is recommended that the Automatic Aid Agreement with Elizabethtown-Kitley be reviewed to consider all the various factors that are associated with this agreement including:
 - Impact on fire protection coverage within the City of Brockville when the fire department is committed to a call in the agreement area
 - The level of service provided in the agreement area in comparison to the level of fire protection service in other parts of Elizabethtown-Kitley
 - The costs associated with provision of this service and fees being charged that should reflect the actual cost to the City of Brockville.
 - Options for various service delivery models that could reduce risks and provide appropriate fire protection and mitigate costs.
 - Other factors in the relationship between these two municipalities that may be considered: It is recommended that the Fire Department budget should reflect the actual cost of services provided to Elizabethtown-Kitley.

Emergency Call Handling, Dispatch and Communications

Brockville Fire Dispatch and Communication Services

The Brockville Fire Department Communication Division is an important part of providing fire protection services to over eighty six thousand residents of Leeds and Grenville and the City of Brockville.

Brockville provides fire dispatch and communications services under a contract with the county for both its own requirements and for other fire departments in Leeds and Grenville, except for Gananoque since 1996. It also currently provides services to the South Dundas Fire Department. The Communications Division also acts as the "after hours" call center for other City of Brockville departments. Over the years the department has continued to upgrade and improve those services with new technology and additional training of communications staff.

The department references "*NFPA 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*" as a guideline to meet the needs of fire department dispatch and communications. Additionally, the department is undertaking to train staff in accordance with "*NFPA 1061: Professional Qualifications for Public Safety Telecommunications Personnel*" which has recently been identified as the training and qualification standard in Ontario for this profession.

The complexity of call handling, dispatching and communications in today's fire service is significantly more demanding than simply answering a telephone and sounding a station alarm. While many calls are still received from the 9-1-1 land line telephone system, there are other methods of receiving an alarm including: hearing impaired callers using text to 9-1-1, mobile calls from both residents and travelers passing through on Highway 401 or other roads, fire alarm activations from alarm companies and via radio notification from other agencies.

Dispatchers must interrogate the caller to determine the nature and location of the emergency, and using the *CriSys[©]* Computer Aided Dispatch system (CAD) determine the correct fire department/fire station to notify, page volunteers and provide details on the incident. Additional notifications of allied agencies including Police, Emergency Medical Services (EMS), Hydro, etc. are also required.

Dispatch plays a major role during an emergency incident and is an integral part of the Incident Management System. Communications are responsible for items such as: monitoring radio traffic, processing and documenting requests, and acting upon emergency signals from firefighter's radios.

Standard for Communications System

The Brockville Communications Division operations are based on meeting the "NFPA 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems"

The following sections illustrate the demanding level of call handling required from a dispatch center.

7.4.1 Ninety-five percent of alarms received on emergency lines shall be answered within fifteen seconds, and ninety-nine percent of alarms shall be answered within forty seconds.*

Brockville Fire Dispatch – receiving transferred 9-1-1 call * *Where alarms are transferred from the primary public safety answering point (PSAP) to a secondary answering point, the transfer procedure shall not exceed thirty seconds for ninety-five percent of all alarms processed.*

7.4.2 Ninety-percent of emergency call processing and dispatching shall be completed within sixty seconds, and ninety-nine percent of call processing and dispatching shall be completed within ninety seconds.*

9-1-1 Emergency Calls

In Leeds and Grenville the 9-1-1 emergency number is available and is the primary way the public contacts emergency services. The United Counties of Leeds and Grenville has contracts with the Ontario Provincial Police (OPP) to provide a 9-1-1 Public Emergency Reporting Service (PERS) for all municipalities including Brockville and Prescott.

When the OPP Public Safety Answering Point (PSAP) center receives a 9-1-1 call the call taker asks the caller if they require police, fire or ambulance service and determines the nature and location of the emergency. The OPP Public Service Answering Point then transfers the caller to the appropriate dispatching agency (the secondary PSAP).

In the case of a fire the caller is transferred to the Brockville Fire Department dispatch center.

Radio Communications and Paging

In 2012 The United Counties of Leeds and Grenville, through resolution GF-075-2012, entered into an agreement with Glentel for the supply and installation of a Digital Simulcast Voice and Paging System subject to the individual municipalities' approval. The new system is a Motorola P25 digital Simulcast System which replaced an old analog system which had a number of deficiencies.

Fire Services in Leeds and Grenville rely on radio pagers to notify the volunteer firefighters and on mobile and portable radios to manage emergency operations at incidents. Paging is on a dedicated paging channel with alpha numeric pagers that provides information to responding volunteers

Computer Aided Dispatch System

Brockville uses the **CriSys[®]** Computer Aided Dispatch (CAD) system that performs essential call handling, location identification with digital mapping, recommended apparatus and records management functions. With the large area and the number of fire departments and stations served by this automated processing of calls allows the dispatcher to quickly and efficiently manage the incident and to meet the NFPA 1221 standard for dispatching.

Staffing

The Communications Division is staffed with four full-time and three part-time dispatchers who provide twenty-four hours a day, seven days a week, three hundred sixty-five days a year coverage and work on a shift schedule of two consecutive twelve hour days followed by two consecutive twelve hour nights followed by four consecutive days off.

Financial Considerations

There is a major capital investment required to operate and maintain an up to date communications center. The current investment in this operation is estimated at seven hundred fifty thousand.

As a result of the contracts for communication services with other municipalities the Communications Division provides a significant contribution to the revenue side of the fire department budget amounting to over three hundred fifty thousand annually.

Dispatch Feasibility Study

In 2010 the city contracted with Beclin Associates Inc. to conduct a feasibility study of combining Fire and Police dispatch services. The study identified four alternatives and the pros and cons of each. As of 2016 the status quo from 2010 continues to be maintained.

The current agreement with the United Counties of Leeds & Grenville and other client fire departments requires a fire based service provider, however, this doesn't restrict other opportunities or alternatives to be considered with the clients/partners.

RECOMMENDATIONS

6. It is recommended that the department continue to operate the Fire Dispatch Services for the municipalities and its own needs while pursuing opportunities to augment its clientele base on a reasonable net cost.
7. It is recommended that the department continue to expand and integrate the *CriSys*® Computer Aided Dispatch System with other functions such as paging, fire prevention records and similar applications to more fully enhance both dispatching and department records management system.

Training Division

Training is mandatory for safe and effective fire department operations and is an on-going requirement to maintain skill levels. Under the Occupational Health and Safety Act, employers are obliged to provide training to employees.

Duties of Employers

25. (1) an employer shall ensure that,
 - (a) the equipment, materials and protective devices as prescribed are provided;
 - (b) the equipment, materials and protective devices provided by the employer are maintained in good condition;
 - (c) the measures and procedures prescribed are carried out in the workplace
- (2) Without limiting the strict duty imposed by subsection (1), an employer shall,
 - (a) provide information, instruction and supervision to a worker to protect the health or safety of the worker

The Training Division is responsible for coordinating all training requirements, developing an annual training plan and assigning the monthly training schedules to each of the four crews. The division is also responsible for providing instruction on specialty courses such as: water and ice rescue, confined space, pump operations, driver training, high-rise operations, and auto extrication.

Training for Company Officers, Fire Prevention and advanced special courses are arranged through the Ontario Fire College in Gravenhurst or at other locations.

Fire department training is based on National Fire Protection Association (NFPA) Standards as the basic training for all members. Specialty or advanced training uses other standards such as NFPA 472: "Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents". Some training required includes training mandated by the Province of Ontario Regulations such as:

- Incident Management System
- Accessibility for Ontarians with Disabilities Act (AODA)
- Workplace Harassment
- WHIMS
- Ontario Health and Safety Act (OH&S)
- Other Ontario legislated training as required

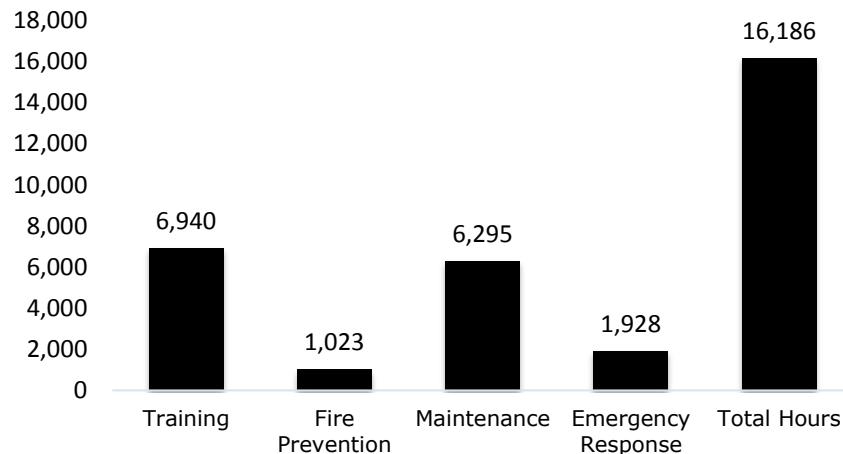
Additional training is also required before firefighters are permitted to perform specialized tasks such as driving and operating pumbers or aerial apparatus, vehicle extrication, ice and water rescue or specialized operations such as confined space rescue, etc. Certification in first aid, CPR and defibrillation also needs to be maintained.

Each captain is responsible for maintaining the essential training requirements for his/her crew. The crews of both stations frequently work together on hands-on practical training such as search and rescue at the training tower.

The Training Division maintains a comprehensive record of training and qualifications for each firefighter to ensure training requirements are achieved and to comply with Ontario Health and Safety regulations.

In 2016, the essential activities of the duty crews in hours of assignment were as follows:

2016 Crew Activity Summary



The Training Division also conducts training for other organizations. In 2016 a total of fifty-seven participants received confined space training. Course participants attended from the following organizations:

- Township of Edwardsburgh Cardinal
- Town of Prescott
- St Lawrence College
- Invista Canada
- Town of Mississippi Mills
- City of Brockville

The Training Division has developed and maintained a comprehensive and effective training program that delivers the required training to ensure firefighters and officers are meeting the competency standards as set out by the National Fire Protection Association, Office of the Fire Marshall, and the Ontario Health and Safety Act. Documentation and sign offs are provided for each member.

The Training Division is proactive in developing partnerships and providing training programs for outside agencies that makes use of the specialized training facilities such as the Confined Space Training, Module, and Training Tower. The partnership with their St. Lawrence College Pre-service Firefighting program is very important and essential to the success of the program.

RECOMMENDATIONS

8. It is recommended that Brockville Fire Department continue to develop partnerships with other fire departments to share in training courses and instructors as an effective means to conduct training activities.
9. It is recommended that the department expand the use of computer based on-line training for the theory portion of many courses. This will assist in allowing firefighters to study and complete assignments at times that are convenient for them. It will also allow trainer/facilitators to focus on practical "hands-on" training.
10. It is recommended that all crews conduct reviews/training on department SOG's, in increments during the year, to ensure members are familiar with the content and understand their roles and responsibilities.

Fire Stations

The City of Brockville is served by two fire stations.

Fire Station No.1

Station No.1 is located in the downtown area at Perth Street and James Street West. This two story station was originally constructed in 1910 and has been in continuous service since. The station has two bays facing Perth Street and has an addition at the back of the station that includes a hose tower and four bays facing James Street West.

Before relocating to Station No.2, the Fire Prevention Division had been operating from the station. Leeds and Grenville Paramedic Service operate a number of ambulances from the station, with leased space for the vehicles and crews. The second floor of the station is used for offices and crew quarters.

Due to the age of the building, many aspects do not meet current building code standards and present challenges in maintenance and operating costs. Recently a fire escape was added from the second floor. The station is not equipped with a fire detection and alarm system or sprinkler system. Other building systems such as HVAC, electrical supply and lighting etc. have been added or modified over the years.

The building is of historical importance and continues to be well located to service the downtown area with good response times in their district. It is suggested that a more detailed analysis be conducted to identify the feasibility to upgrade or replace this facility.



Fire Station No.2

In 1990 a recommendation was made to construct a second fire station for Brockville's north end. The addition of this station addressed the service needs of this area of the City that could not be effectively served by the existing fire station on Perth Street. Fire protection for the industrial facilities in this area was seen as a key issue. At the same time, additional growth of commercial and residential properties was occurring or planned and was factored into the need for this new station.

Currently, the station is headquarters to the Administration, Communications, Training and Fire Prevention Divisions. The facility also has a well-designed training tower and associated props with sufficient space to conduct hands-on training. Additional space is leased to Leeds and Grenville EMS which operates their day time ambulance from the station.

During our stakeholder meetings, Councilors questioned the need for having two fire stations to serve an area of 20.9 km^2 (8.0 sq.mi.) and a population of twenty one thousand vs. a single fire station. A single station model for the City of Brockville would have significant limitations in providing an appropriate level of service to the residents.

The following table illustrates response times from each station and a general central station vs. the Googled response times to typical addresses

in the north, central and south sections of the City from both stations 1 and 2 and a typical central station which could be located in the area of Ormond Street and Central Avenue (Giant Tiger). Results from the brief evaluation show that response times were for most part increased in both north and south sections while slightly improving in the central section.

While each section of the City has variable risks, the north section contains the majority of industrial occupancies in addition to the high number of vulnerable occupancies. The south section of the City has the majority of senior's residence, vulnerable occupancies and the hospital. Increasing response times to either the north or south sections puts those residents and occupancies at a higher risk.

Additionally, the investment associated with building a centrally located station would be around six million dollars and would result in limited benefits and no significant savings.



BFD fire hall #2 Brockville, Ontario Canada 03082009 ©Ian A. McCor

Location	Address	Actual Response Time From Stn. 1	Google Timed Response	Actual Response Time From Stn. 2	Google Timed Response	Google Time Response From a Central Stn.
North						
Shell Oil	250 Laurier Blvd.	6:31	10:00	2:21	2:00	5:00
Proctor & Gamble	1475 California Blvd.	8:06	13:00	4:26	4:00	8:00
Bridlewood Manor	1026 Bridlewood St.	7:17	11:00	1:59	1:00	6:00
Home Hardware	584 Stewart Blvd.	5:01	6:00	3:50	4:00	5:00
Central						
Brockville General Hospital	75 Charles St.	3:59	4:00	7:36	6:00	3:00
Toniata Public School	24 Scace St.	5:09	8:00	5:41	7:00	4:00
YMCA	345 Park St.	5:11	5:00	5:17	5:00	1:00
Holiday Inn Express	7815 Kent Blvd.	6:30	5:00	6:14	6:00	4:00
The Home Depot	2120 Parkedale Ave.	9:18	8:00	4:46	3:00	3:00
South						
Brockville Country Club	1548 County Road 2	5:02	4:00	11:43	12:00	9:00
Tall Ships Landing	15 St Andrew Street	3:26	4:00	8:33	11:00	6:00
Fulford Place Museum	287 King Street East	3:42	6:00	5:42	8:00	5:00
St.Lawrence Lodge	1803 County Road 2	3:39	6:00	6:31	9:00	6:00
APEX	100 Strowger Blvd.	4:39	4:00	6:23	8:00	3:00

As an example, assume Station No.1 is responding to a call north of the Canadian National Railway Line. With the high volume of both freight trains, Via Rail passenger trains and the frequent shunting of long strings of cars from the CN yard, the level crossing at Perth Street is often blocked and in some cases, for extended periods of time. This is a serious impediment to providing response from Station No.1 to the north end.

Only William Street/Stewart Boulevard and North Augusta Road have overpasses for the railway lines and Highway 401, so this effectively divides the City into two fire protection districts. The same limitations apply to Station No.2 responses south of Highway 401 and the railway lines.

While the terms of reference for this report did not include a detailed fire station location study which requires substantial data analysis and mapping of fire response times, there are some basic factors that can be considered before deciding if a comprehensive fire station location study will generate a significantly different deployment model.

Factors to consider include:

- Present station locations
- Response times for each station
- Mapping location of calls
- Risks being protected – historic downtown vs. north end residential, commercial and industrial areas.
- Location of high risk and vulnerable facilities (hospitals, seniors, multi-story mixed use, industrial etc.)
- Road network, access, traffic patterns and volume
- Impediments to access – e.g. Highway 401, Railway lines, level crossings
- Traffic signal pre-emption
- Staffing
- Number of apparatus required
- Insurance costs to the taxpayer

Alternative sites for a single fire station are:

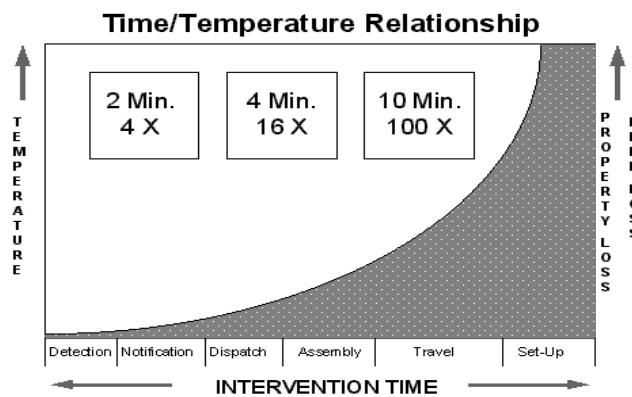
- In a better location for response to all districts in the City
- Of sufficient size to accommodate all fire department functions – administration, training, fire prevention, communications and fire suppression crews
- In an area zoned and approved for fire stations and acceptable to the neighboring community
- Affordable for land and servicing costs

A single fire station in Brockville would result in a decrease in overall protection capacity to either the old downtown core and adjacent areas if the station was located in the north end or a similar reduction to protection available in the north end to the important commercial, industrial and residential sectors if the station were located south of the railway.

Response Times and Resource Deployment

Response Times for Fires

Response times are important in emergencies because the sooner first responders arrive at the incident the better the chances to save lives and limit property damage. The "Time/Temperature Curve" chart below illustrates the growth of fire over time and the importance of prompt intervention to limit loss of life and property.



The sooner the fire department can begin fire suppression, the greater the chance of a successful outcome in protecting the people and property. The growth of a fire is dependent on fuel and air supply and heat generated. Once a room on fire reaches approximately 1000°F (590°C) a "Flashover" will occur with the entire room involved in fire. This can occur in six to ten minutes or less after a fire starts. The loss of life and property are greatly increased following a flashover. Appropriate response time and firefighter intervention increases the chance of rescue and improves fire control prior to a flashover occurring.

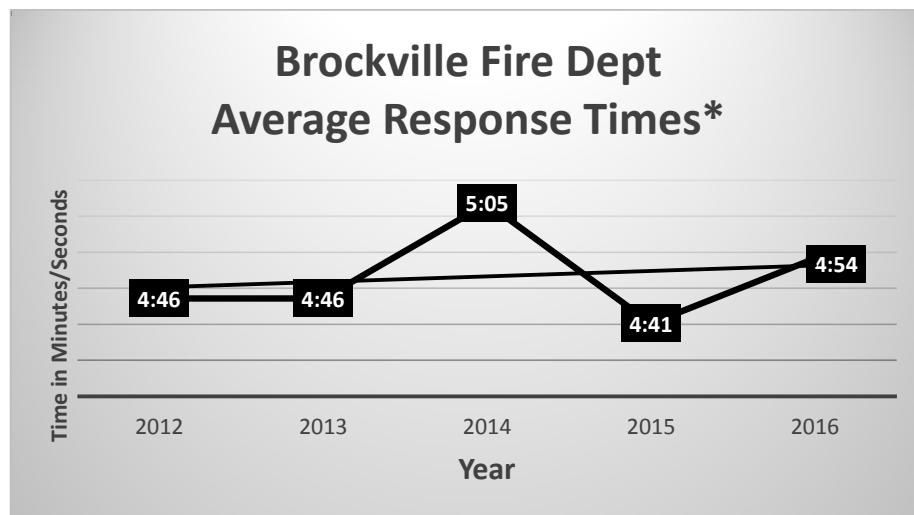
The following illustrates the impact of temperature on humans and materials:

°C	°F	Response
37	98.6	Normal human oral/body temperature
44	111	Human skins begins to feel pain
48	118	Human skin receives a first degree burn injury
55	131	Human skin receives a second degree burn injury
72	162	Human skin is instantly destroyed
100	212	Water boils and produces steam
250	482	Charring of natural cotton begins
>300	>572	Charring of modern protective clothing fabrics begins
>600	>1112	Temperatures inside a post-flashover room fire

Resource Deployment

The location of fire stations and adequate fire ground staffing are important factors to mitigate incidents in a safe and efficient manner.

In large urban centers with full-time firefighters and multiple stations, response times are frequently in the five to eight minute range. In rural areas response times can frequently be ten to twenty minutes depending on the size of the municipality, number and location of fire stations, road network, etc.



* The response times are taken from calls for Fires (all types), Remote Alarm Activations and Smoke calls in the years indicated. These are the benchmark call types for evaluating fire response times. These times are from the first unit dispatched to the first unit on scene.

As shown in the above chart, the Brockville Fire Department has an excellent response time record. Brockville compares very favorably with other fire departments having full-time staffing and substantially better than volunteer fire departments are able to achieve. This good response time is an important advantage in limiting the size and spread of a fire.

Response and Deployment Standards

The determination of how many firefighters are required has been a concern with municipalities for years. We know that the first Brockville Fire Brigade in 1833 was authorized to have a captain and forty eight firefighters. That number has varied over the years but was determined almost entirely by local needs as the City changed.

In recent years the provincial government, through the Occupational Health and Safety Act and the Fire Protection and Prevention Act, has been an important influence in the decision making process for fire department staffing. Under the Ontario Health & Safety Act the employer (City and Council) have responsibilities to protect employees from workplace injuries or death. Employee training and competent supervision are requirements of the Ontario Health & Safety Act and Regulations.

One staffing model that was widely used in Ontario was developed by the Office of the Fire Marshal in the 1990's and referred to as "10 in 10". It recommended that ten firefighters are on scene within ten minutes. The "10 in 10" was one part of a "Comprehensive Fire Safety Model" that identified seven sub models impacting fire protection

Comprehensive Fire Safety Effectiveness Model



Under the Fire Ground Effectiveness sub model the "10 in 10" Staffing Chart was developed to identify the functions that needed to be completed during a fire. This model is a baseline and was based on a fire in a single family dwelling with a municipal water supply. In rural areas additional firefighters and tankers would be required for water supply. In larger buildings and high risk occupancies many more firefighters would be required.

Fire Ground Fire Suppression Staffing Chart

Complex Rescue and Subsequent Fire Control	Firefighter Functions	Number of Staff
Establish Water Supply	Water supply hook-up to hydrant	1
	Pump operator/drive	1
Size Up	Supervisor-Command & Control	1
Rescue	Search & Rescue	2
	Back up, 60m of pre-connect 38mm hose	2
Exposures	60m of pre-connect 38mm hose. Water supply person assists when water supply is secured	1
Ventilation	Raise 7m ladder plus equipment	2
Confinement	Sequential, rescue back up team begins confinement when rescue operation is complete	-
Extinguishment/Salvage & Overhaul	Sequential, other staff assigned when earlier duties completed	-
Total		10

Many fire departments still use the "10 in 10" as a best practice for emergency response and deployment.

The *NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*

Fire Department response performance objectives contained in the NFPA 1710 Standard include time for call taking and dispatch, turnout time for firefighters (eighty seconds), and travel time for the first responding fire pumper to arrive on scene (objective = four minutes from the time they leave the station until they arrive on scene). There is also a benchmark for a full assignment of firefighters to arrive on scene (objective = eight minutes from the time they leave the station until they arrive on scene). The full assignment is the group of firefighters needed to adequately handle the emergency situation.

NFPA 1710, Section 5.2.3 recommends four person crews for both Engine (pumper) companies and Ladder companies as minimum levels necessary for safe, effective, and efficient emergency operations. The Standard also recommends a total of fourteen to fifteen firefighters as a full initial assignment that arrive on-scene within the eight minutes, ninety percent of the time.

NFPA 1720: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments.

NFPA 1720, Section 4.3.1 recommends the Fire Department shall identify minimum staffing requirements to ensure that a sufficient number of members are available to operate safely and effectively. This standard is more general in nature and bases staffing response times on demand zones and demographics. There are no specifications on how firefighters arrive on scene.

OFM "10 in 10" guidelines and NFPA 1710/1720 Standards are not legislated requirements in Province of Ontario and individual municipalities still have the ability to determine the level of staffing and how it will be achieved based on Council decisions. However, these standards and guidelines would represent "Best Practices" in determining what level of staffing should be considered. They would also be referenced in any litigation that may involve the fire department service levels and municipality liability for losses. The Collective Agreement with the Brockville Professional Firefighters Association includes the provision of "*the number of full-time firefighters available for initial response shall be five.*" Any change in staffing would require consideration of these provisions.

Staffing for Emergency Response

Staffing for emergency response or fire suppression is the largest component of any fire service, the ability of the department to deploy sufficient numbers of firefighters in a timely manner is a key indicator of the ability to provide emergency services to the public.

Fire departments have used a number of different approaches to providing the staffing needed to provide emergency response that is available twenty-four hours a day, seven days a week, three hundred sixty-five days a year. The use of all volunteer fire service, a composite department with both full-time and volunteers and all full-time departments are the most common models.

The use of volunteers to supplement full-time firefighters is a cost effective means of providing both a quick initial response with a limited number of firefighters plus the availability of a much greater number of volunteer firefighters for those serious incidents where additional staffing is required.

Brockville had a volunteer force of about sixteen members, with volunteers assigned to work with each shift. The number of volunteers diminished until 2005 when Council decided to disband the last of the volunteers. At the same time an agreement was reached with the Brockville Professional Firefighters Association for their members to carry pagers and respond to calls when off-duty. Depending on the number of off-duty firefighters, their distance from home to the fire department and their availability on any given day, that method of supplementing the on-duty crew may be a viable alternative to increasing on-duty staffing or to the use of volunteers to augment staffing during emergencies.

In other cases Fire Protection Agreements or Mutual Aid from other fire departments is used to supplement the response to help improve response time and resources until the off-duty firefighters can arrive from the call-back procedure.

Delays in Call-Back Coverage

An important concern that has been identified with the present system of call-back of off-duty firefighters is the delay in response to the call back. A review of seventeen structural fire calls in Brockville from March 2011 to August 2016 indicates that the average time for a call-back crew to arrive with the third truck on scene was thirty-two minutes. This is an excessive length of time when considering the Ontario Fire Marshall and National Fire Protection Association recommendations of eight to ten minutes. With only five firefighters available for fire suppression and rescue, this delay of three times the recommendations puts both the public and firefighters at risk.

Adding to this concern are calls to the Elizabethtown-Kitley Fire Protection area, where all on-duty staff respond to emergencies, leaving no fire protection coverage in Brockville, where a similar delay of approximately thirty minutes would be expected.

Full Time Staffing

The Brockville Fire Department maintains a minimum of five firefighters on-duty with three at Station No.1 and two at Station No.2. This number includes the captains who provide supervision.

The following chart illustrates the factors that must be considered when determining how many firefighters are needed to provide on-duty staffing twenty-four hours a day, seven days a week, three hundred sixty-five days a year. The following table shows the overall requirements for one, four and ten firefighter's on-duty for each shift.

Firefighters on-duty	1	4	10
Days to Cover	365	365	365
Hours per day	24	24	24
Hours to cover	8760	8760	8760
Total hours	8760	35,040	87,600

Calculation of hours a firefighter would be available for work based on a forty-two hour work week

Annual hours employed	42 hours x 52 weeks	2184 hours
Deductions from available hours		
Vacation-three weeks	12 hours x 15 days	180 hours
Statutory holidays	12 hours x 13 days	156 hours
Training courses	12 hours x 10 days	120 hours
Sick, Bereavement, misc. leave	12 hours x 5 days	60 hours
Net Hours on-duty		1668 hours

Calculation of how many firefighters must be employed and cost based on the average firefighter salary plus benefits

Example	Hours Required	Hours Available	Hrs. Req. / Hrs. Available = Number of Firefighters Needed	Annual Salary and benefits costs est.
1	8760	1668	5.25	\$525,000
2	35040	1668	21.0	\$2,100,000
3	87600	1668	52.5	\$5,250,000

Volunteers, Part Time and Call-back

As noted above the use of volunteers is a common method of providing fire department service. The term "volunteer" firefighter in this report is based on that found in the Fire Protection and Prevention Act.

"Volunteer firefighter" means a firefighter who provides fire protection services either voluntarily or for a nominal consideration, honorarium, training or activity allowance. 1997, c. 4, s. 1 (1); 2001, c. 25, s. 475(1).

In Ontario the majority of volunteers are compensated for their time for training, emergency response and other duties such as fire prevention.

Most fire departments using volunteers are experiencing difficulty recruiting and retaining those members. The increased requirements for training and certification, the number of calls and risks posed by this work have discouraged many individuals from becoming volunteer firefighters. The City of Brockville experienced some of these issues when the number of volunteers declined to the point where they were disbanded in 2005.

While re-introducing a volunteer component into the fire department will bring challenges, a properly prepared action plan can make the transition achievable. This action plan would include criteria for recruiting, training and equipping the sufficient number of volunteers. Personal Protective Equipment, pagers, WSIB, life insurance as well as hourly rates of pay for the volunteers would be budgeted.

With the five on-duty firefighters plus volunteers, this would provide sufficient numbers to meet or exceed recognized standards.

Another option to consider would be the use of full time casual firefighters. In contrast to volunteers who are only called for emergencies, these firefighters would be integrated with the full-time permanent firefighters and scheduled to work on a regular basis to maintain staffing when there is a vacancy. This option allows more flexibility with maintaining on-duty staffing at a reduced cost while having these full time casual firefighters available for call back for emergencies. The department presently uses Part-time dispatchers for the Communications Division and the Brockville Police have also introduced Part-time police officers to help with staffing in their service.

Findings

The Brockville Fire Department staffing is organized in such a manner due to geographical barriers and building stock. The requirement for staffing two fire stations due to access limitations is accomplished by the minimum on-duty staffing of three firefighters at Station No.1 and two firefighters at Station No.2. This current arrangement allows for an assembly on scene of five firefighters.

Callback of off-duty firefighters can provide additional resources, however there frequently is a delay of some twenty to thirty minutes before an additional fire crew is assembled and able to respond. Reducing this delay in obtaining additional help on scene is the most critical factor in improving fire suppression and rescue capability during a serious incident.

The addition of full time casual and volunteer firefighters will increase on scene staffing available for major events that would provide an adequate level of service for the residents and optimum safety of personnel.

RECOMMENDATIONS

11. It is recommended that discussions be undertaken with the Brockville Professional Fire Fighters Association to address the need to improve the ability of the department to quickly have additional firefighters available for call-back for major fires and emergencies and also when the on-duty crews are dispatched out of the City for responses.
12. The addition of full time casual and volunteer firefighters should be initiated to augment the current staffing with the goal of meeting adequate on scene staffing levels.

Fire Apparatus and Equipment

Fire apparatus (pumpers, tankers, rescues, aerials, etc.) often referred to as "fire trucks" are the means by which fire departments deliver emergency services to the residents and businesses of the municipality. To control or mitigate an emergency, the fire service responds with firefighters and properly equipped apparatus. Fire apparatus represents a significant investment for a municipality. Maintaining and replacing apparatus to ensure a reliable and modern fleet is an important part of managing and planning fire service delivery.

Fire Service apparatus has evolved over the years and there are increasingly more demanding standards that must be followed when purchasing apparatus. They include the *Ontario Health and Safety Act*, *National Fire Protection Association Standard 1901 – Standard for Automotive Fire Apparatus* and/or *ULC – S515-04 – Automotive Fire Fighting Apparatus*. Because of continuing changes in safety requirements, construction materials and operating practices, older fire apparatus do not have many of the features now mandated. Among the most important are Anti-lock Brake Systems (ABS) and Roll Stability Control (RSC) that help minimize accidents by improving steering and braking control.

Another factor in determining when apparatus should be replaced is the impact of the Fire Underwriters Survey (FUS) on the age of apparatus that is acceptable for insurance grading purposes. In smaller communities FUS will only recognize apparatus that is no more than twenty years old. (Fifteen years old in larger cities). These factors emphasize the importance of planning and budgeting to replace older apparatus to reduce the risk to the municipality and its firefighters.

Apparatus Inspection, Testing and Maintenance

Fire apparatus must be maintained to a high level of availability to ensure they will start and operate anytime an emergency incident occurs. This requires a robust system of daily, weekly and annual inspections, tests and maintenance. In addition to routine maintenance such as checking and adjusting brakes, lubrication, oil changes, etc. the apparatus must have annual Ministry of Transportation (MTO) inspections, pump tests and non-destructive testing on ladders and aerial devices. This routine maintenance requires that each vehicle is out of service a number of days every year to complete this scheduled work.

As noted above, standards have become more demanding and complex with the introduction of new safety systems, pollution control, and engine and driveline systems using computer interfaces. In the past, many components on fire apparatus could be repaired or maintained by mechanically skilled firefighters or a local garage. Much of this work now requires mechanics with specialized training and computer analysis of system faults. As a result, some apparatus may be out of service for longer periods of time while repairs are carried out.

At present, routine maintenance of the fire fleet is carried out by the Public Works mechanics while specialized work is contracted to appropriate mechanical shops or fire apparatus manufacturer. New apparatus are covered by warranties of various lengths for different components and this avoids some large potential repair costs that could be encountered with old apparatus.

The fire apparatus appears to be well maintained and the Fire Department and Public Works Department Fleet Services are commended for their cooperative efforts in this regard.

Fleet Renewal and Rationalization

The Fire Chief has developed and recommended to Council a plan to renew the Brockville Fire Department fleet with the replacement of older apparatus that will result in a reduction in maintenance costs while increasing reliability. City council has recently (August 2016) approved the purchase of a new aerial platform at a cost of one million five hundred twenty four thousand eight hundred two and a new pumper at a cost of seven hundred fifty two thousand four hundred seventeen. This is a significant commitment to providing the fire department with modern reliable fire apparatus.

The number of apparatus in the fleet has been reduced from seven to five units consisting of two pumper/rescues, two Aerials and one rescue support vehicle. The plan reduced the age and the size of the fleet and the operating costs of maintaining the fleet. The plan consists of two components, first being the procurement of newer vehicles and the second being the reduction of maintenance costs. In order to continue with the reduction of annual operating costs, the replacement fleet plan must be maintained.

The City of Brockville is serviced with municipal water supply and hydrants and therefore the fire department does not operate any tankers. In the area of Elizabethtown-Kitley covered by the Automatic Aid Agreement there is limited hydrant protection and water supply at some locations would require tanker support from the Elizabethtown-Kitley Fire Department. Consideration should be given to ensuring this tanker support is well integrated with the operational procedures of the Brockville Fire Department.

Fire Equipment

There is a large variety of fire and emergency equipment used by the fire service. Personal Protective Equipment (PPE) includes bunker gear (firefighting coats and pants), helmets, flash hoods, gloves and boots all of which must meet NFPA standards to comply with Occupational Health and Safety regulations. Self-Contained Breathing Apparatus (SCBA) is required anytime a toxic atmosphere is present or suspected such as at fires, carbon monoxide calls, hazmat spills, etc. The Brockville Fire Department has a program and budget to maintain, clean and replace this PPE in order to provide firefighters with protection from the hostile work environments they encounter at fires and other emergencies. The department has a large inventory of other equipment including: fire hose , nozzles and fittings, ladders, generators and lighting, ventilation fans, portable pumps, saws, extrication tools (Jaws of Life), gas detectors, thermal imaging cameras, ice and water rescue equipment, and many types of hand tools. All this equipment must be maintained and replaced as required.

RECOMMENDATIONS

13. With the recent changes made to the fleet composition as a result of the Fire Chief's 2016 report to Council it is recommended that this fleet plan continue to be supported.
14. It is recommended that the cooperative arrangement between the Fire Department and Fleet Services division for vehicle procurement and servicing be continued.

Water Supply

Water supply is essential for effective fire suppression and the Fire Underwriters Survey attributes thirty percent of the insurance grading schedule to that component.

Water supply for fire protection is classified in two categories:

- Municipal Water Supply – hydrant protected and
- Rural Water Supply non-hydrant areas.

Municipal Water Supply (Hydrant Protected)

Water supply for fire protection is provided by a municipal water supply and distribution system. The City of Brockville is responsible for the supply of potable water with sufficient flows to meet firefighting requirements and for the local distribution system including fire hydrants. Hydrant protected properties usually have lower insurance premium costs than non-hydrant protected properties.

In reviewing the water supply with the Environmental Services Department they indicated that the capacity of the water treatment/pumping stations is more than sufficient to meet daily average volumes with only about a third of the capacity of thirty-six million liters per day being utilized, leaving sufficient additional capacity if required for larger firefighting demand. The city has three pressure zones with reservoirs, water tower, and pumping stations strategically located. The water distribution network uses a grid system to balance flows and provide redundancy in most areas.

The water treatment plant pumps water through a single trunk main before it enters the distribution grid. This single main represents the weak link in the system and has been identified by the department as a high risk concern. A twining of this main would provide a much greater level of safety for continued availability of water if the existing line were to experience a failure.

There are eight hundred forty-five fire hydrants in the water system. The Environmental Services Department have a comprehensive program to flow test and mark hydrants with flow capacity by colour coding in accordance with "*NFPA 291: Recommended Practice For Fire Flow Testing And Marking Of Hydrants*" and an annual hydrant maintenance program is carried out to provide reliable hydrant operation under any weather conditions.

In 2016 from the flow testing the City of Brockville has the following totals:

- Red Hydrants (0- 499 gpm) – 76
- Orange Hydrants (500-999 gpm) – 134
- Green Hydrants (1000-1499 gpm) – 195
- Blue Hydrants (> 1500 gpm) - 440

At present there are seventy-six "Red" hydrants in the city with flows less than 500 gpm. These hydrants would be inadequate to meet firefighting flow requirements in any significant fire. The Environmental Services Department has an ongoing program to replace aging water lines to improve reliability and flow rates. Budget priority should be given to municipal sectors where red hydrants are concentrated.

As identified in the Official Plan in urban development areas all new developments are required to provide water supplies and hydrants to meet the fire flow established by the Fire Underwriters Survey. On commercial or industrial sites with private hydrants the developers provide certification of hydrant installations and water flows to the satisfaction of the Fire Chief before occupancy is granted.

Rural Water Supply (Non-hydrant areas)

Water supply for fire protection in rural areas (non-hydrant protected) presents significant challenges for fire departments. In Brockville there are only a few areas without access to a municipal water supply and in those cases water tankers may be requested from Elizabethtown.

In the Elizabethtown Fire Protection Agreement area only limited municipal water supply is available and there is a need to rely upon water tankers from Elizabethtown for water supply at fires in this area.

RECOMMENDATIONS

15. It is recommended that in any area of the City where fire flows are limited or unavailable, the department request water tankers from Elizabethtown-Kitley as part of the initial dispatch.
16. It is recommended that the Environmental Services Department consider having a Water Supply Master Plan developed to help identify areas for improvement and long term capital budget requirements.
17. It is recommended that areas of low fire flow (Red hydrants) be identified and a plan implemented to undertake renewal and replacement of undersized pipes and dead end lines, etc.
18. It is recommended that any new development areas conform to the requirements of the Official Plan with respect to water supply and hydrants for fire flows as established by the Fire Underwriters Survey.

Fire Prevention and Public Education

Fire Prevention is the best and most effective way to protect lives and property from loss due to fires. While fire trucks and firefighters responding to emergencies attract public attention and the news media, it is the fire prevention and public education work that can have the biggest impact on community fire safety.

The Fire Protection and Prevention Act, (FPPA) 1997 S.2 (1) includes the mandatory requirement for provision of fire prevention and public education.

Subsection 2.(1) Municipal Responsibilities

Subsection 2.(1)

"Every municipality shall,

1. establish a program in the municipality which must include public education with respect to fire safety and certain components of fire prevention; and
2. provide such other fire protection services as it determines may be necessary in accordance with its needs and circumstances."

The Office of the Fire Marshal has determined that this requirement includes the following components:

- A recognized smoke alarm and home evacuation program
- Fire inspections and evacuation for vulnerable occupancies
- Fire inspections on complaint or request
- A public education program

Completion and maintenance of a Simplified Risk Assessment to determine the risks in the community and the level of fire prevention and emergency response required.

In 2013 there were two new regulations made under the FPPA that mandate specific fire prevention activities:

- O.Reg.365/13: Mandatory Assessment of Complaints and Requests for Approval
- O.Reg.364/13: Mandatory Inspection – Fire Drill in Vulnerable Occupancy

The work of the Fire Prevention Division is carried out primarily by the Chief Fire Prevention Officer and the Fire Prevention Officer. An Administrative Coordinator is assigned to Fire Prevention to maintain records and administrative matters in the Division. The Division is assisted by the on-duty Suppression crews with various activities such as home visits and smoke alarm program, and having a presence at community events or during Fire Prevention Week.

The Fire Prevention Division will be relocating to Fire Station No.2 in the coming months. This will provide a more efficient and accessible office location and improve interaction with the other divisions of the department.

Fire Safety Inspections and Compliance Complaint Inspections

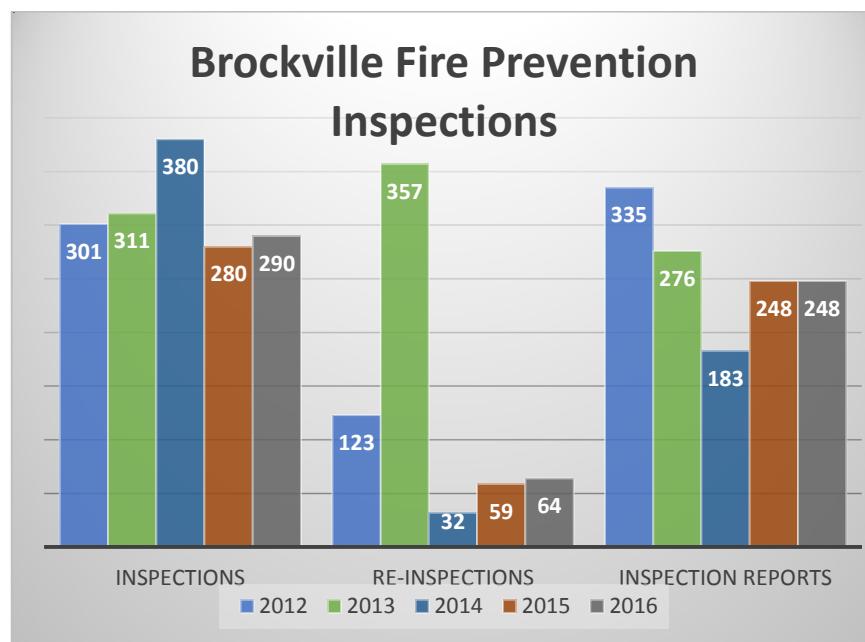
Complaint inspections are conducted as the result of a complaint regarding a possible Fire Code violation. All complaint inspections are followed up with correspondence in the form of a letter or a note to file. These inspections are mandatory under the FPPA.

Request inspections

Request inspections are usually conducted for a new occupancy, licensing or sale of a property or for assistance with Fire Code compliance. There is a fee for such inspections. These inspections are mandatory under the FPPA.

Routine inspections

Routine inspections are conducted when concerns are brought to the attention of the Fire Prevention team by other means (i.e. – home inspection program, retrofit, general enquiry, etc.), or when they undertake to inspect specific occupancies or areas of the city.



Fire Code Compliance Procedures

As the result of inspection activities, a report is generated that identifies any deficiencies in compliance with the Fire Code. The deficiencies are specified in an Inspection Order that is provided to the property owner who is required to correct the deficiencies. A re-inspection is then required to verify if the deficiencies have been corrected. Normally a re-inspection is conducted in about thirty days. Should the property owner fail to correct the deficiencies then enforcement action can be undertaken.

Fire Code offences which have approved short form wording and set fines can be commenced by Certificate of Offence in a Part I proceeding. A set fine has been prescribed by the Chief Judge, Provincial Division for each of these

offences. Alternatively, you can institute a proceeding for these violations under Part III of the Provincial Offences Act by swearing information.

In Part I of the POA there are approximately forty-right offences in Schedule 17.4 under the Fire Code that are identified and have set fines of either \$ one hundred ninety-five or two hundred ninety-five. Fire Prevention officers are considered Provincial Offences Officers for the purpose of enforcing the Fire Code and can issue tickets for those offences. Alternatively using Part III of the POA requires swearing information, preparing a court brief and appearing in court for the case to be heard.

The Brockville Fire Prevention Division has been utilizing Part III of the POA for code enforcement as the standard procedure. This action may result in higher fines than are provided for in the Part I Schedule, however the time and cost for using only Part III is not efficient or cost effective for those charges that can be laid under Part I. A review of compliance and enforcement practices should be undertaken to ensure the most appropriate method is used and time and costs to the department are minimized.

Year	2012	2013	2014	2015	2016
Charges Laid	0	13	8	0	3
Fines	\$0	\$7,500	\$2,735	\$0	\$500
Average Fine	\$0	\$576	\$341	0	\$166

Fire Investigations

Investigation of fires is a requirement of the FPPA. The purpose is to identify the cause and, if it is an accidental fire, to use the information to reinforce fire prevention and public education. If the cause is determined to be suspicious, then the Office of the Fire Marshal and the police are notified. Arson is a criminal offence and is sometimes used to cover other criminal activity or to defraud insurance companies.

The preliminary investigation of cause, origin and circumstances of fire is a responsibility of the local fire services and is an essential component of fire protection. For fire personnel to adequately determine the origin and cause of fires, advance training in arson detection is essential. The Brockville Fire Department actively investigates and reports on fire cause determination within their community.

Public Education Activities

Public Education activities are intended to bring the importance of fire safety to the community using a variety of means including:

- Presentations to various groups are specifically targeted to meet the needs of the group such as students, health care workers, seniors groups, industry, etc. These presentations usually involved fire department apparatus (i.e. fire extinguisher tutor, 9-1-1 simulator, fire safety videos) and in some cases hands-on training for those involved.
- Community events such as school fairs, Canadian Tire Days, Home Depot's Fire Safety Awareness Day, St. Lawrence Park's Beach Party etc. where brochures, books, and other fire safety teaching materials were distributed as well as Fire fighter and fire apparatus that offer families a close-up look at the fire trucks and provide them with fire safety information.

Public Service Announcements (PSA's) on radio and in print are used for events such as Fire Prevention week, "change your clock, and change your battery" smoke alarm campaign and during Christmas season.

Plans Review

The Fire Prevention Division has responsibilities and carries out work to conduct reviews of new development planned in the city. The division reviews site plans for new buildings to identify the proposed occupancy and use, the building site design for access and water supply. At the building permit stage the division reviews fire protection elements of the building and may conduct occupancy inspections of fire protection systems such as fire alarm systems and exhaust hoods. They will also determine if a Fire Safety Plan is required and review and approve those plans. This work is identified in SOG's 212-008 and 212-009.

Home Fire Safety Awareness Program

This program involves on-duty firefighters visiting residential neighborhoods and offering home owners information on fire safety as well as the opportunity to have their smoke and carbon monoxide detectors checked. While there is no legal requirement for home owners to have their detectors or property inspected it is offered as a service to those interested. Fire safety information materials are left with the occupants or at the door.

This program is well received and was identified during as a very positive and welcome opportunity for residents to meet and interact with the firefighters.

Simplified Risk Assessment

Municipalities have a legislated responsibility under the Fire Protection and Prevention Act (FPPA) to provide public education with respect to fire safety and certain components of fire prevention. Conducting a simplified risk assessment is the first step towards compliance with these requirements and is intended to identify information required by a municipality to make informed decisions about the programs and activities necessary to effectively manage the community fire risk based upon local needs and circumstances.

Simplified Risk Assessment 2016

Objective: Conducting a simplified risk assessment is a practical information gathering and analyzing exercise intended to create a community fire profile that will aid in identifying appropriate programs or activities that can be implemented to effectively address the community's fire safety needs.

As a minimum requirement, a community fire safety program must include:

- A simplified risk assessment
- A smoke alarm program
- Distribution of fire safety education materials, and,
- Participating in inspections upon complaint or when requested to assist with fire code compliance

As each community is different, the simplified risk assessment and ensuring fire concern profile will assist in identifying the degree to which these activities are required in accordance with local needs and circumstances. The simplified risk assessment is made up of the following components:

- Demographic profile
- Building stock profile
- Local and provincial fire loss profiles
- Information analysis and evaluation
- Priority setting for compliance
- Implementing solutions

Demographic Profile

Ages of population	#	% of Total Population
0-14	2,990	13.7%
15-64	13,910	63.6%
65 and over	4,980	22.7%
Total Population	21,870	100%

Vulnerable groups / individuals (e.g., non-ambulatory/limited mobility)	Population fluctuation (e.g., tourism, student)
<p>Brockville General Hospital-85 Beds St, Vincent de Paul Hospital-47 Beds Wedgewood Retirement Resort (the 2nd floor and is a class B occupancy, most of the 27 rooms occupants will require some form of assistance.)</p>	<p>St. Lawrence College serves 710 full-time students. A student residence constructed in 2005 provides 29 double occupancy rooms with ensuite bathrooms.</p>
<p>Brockville Mental Health Centre – Forensic Treatment Unit – 59 beds Secure Treatment Unit – 100 beds (under contract with City for Fire Services)</p>	<p>Fulford Academy is a private school teaching English as a second language. The school contains residence for 50 students, many who speak very little or no English.</p>
<p>Brockville & Area Community Living Assoc. (BACLA) has a total of 11 homes caring for 39 clients requiring supervisory care.</p>	<p>Tourism and Travel</p>
<p>Six Senior Citizen residential buildings throughout the city as well as a large number of seniors living in other apartment & condominium units. An example is 55 Water St. (The Executive Bldg), which has 81 units of which 80 are lived in by Seniors. There is an approx. 50/50 split on couples and single occupants in these units. Many Seniors today live alone.</p>	<p>City owns 16 camping and picnicking islands, 13 private cottages are located on 2 private islands, Smith Island having 12 and Oriental Island having 1. St. Lawrence Park has camping facilities. Trailer Parks are not permitted in the City by By-Law. Boating traffic increases in the summer months, with the city having 86 plus docking slips and 38 island docks for day use & overnight camping.</p>
<p>Total number of vulnerable individuals is not available as this data is not maintained by the city. Fire Dispatch keeps records of those in apartment buildings that require assistance in an emergency.</p>	<p>4 motels & 1 hotel serve the city with a total of 381 Rooms able to accommodate 1188 guests. The Tourism Hospitality Sector has over 500,000 people pass through the area annually.</p>

Mean age of Total Population – 47.1 yrs. (Male 45 yrs. & Female 48.7 yrs)

*Source: Statistics Canada Population Statistics for City of Brockville 2013

Barriers to Public Education

No cultural/language barriers have been identified.

Ninety-one percent of the population reported English only as mother tongue, three percent reported French only, and five percent reported a non-official language only. These small groups are well dispersed throughout the community and are not living as communities within the community. Two school boards operate twelve schools with approximately four thousand five hundred students combined, and each board offers special education programs including French Immersion. Ecole Ange-Gabriel is Brockville's only all French school with approximately three hundred twenty students enrolled.

Information Analysis and Evaluation – Municipal Fire Loss

The data collected is examined, evaluated and analyzed for the purpose of identifying potential fire risks (community fire profile) within the community. The development of a community profile and the identification of priorities serve as the basis for selecting activities in the areas of public education and fire prevention, based upon local needs and circumstances.

Demographic Profile Concerns

Potential fire concerns relating to demographics:

- Average age of population continues to rise, with more seniors living on their own.
- With increased home care being offered, the amount of people living on their own that require assistance has increased. Fire Safety Plans indicate this, as plans are listing more occupants requiring assistance in an emergency.
- Large number of seasonal boaters that increases activity at waterfront docks and at the sixteen city-owned islands during summer months. Other islands in the Brockville area cause increased traffic as well. Some islands contain private seasonal cottages.
- Trailer & tent camping in St. Lawrence Park during summer months.
- Two hospitals operating one hundred thirty-two beds, providing both short term and palliative care.
- The Brockville Mental Health Centre has one hundred fifty-nine beds on site with seven hundred twenty-five outpatients living under supervision in the community.
- Over twelve group homes identified in city, many residents requiring supervision.

Building Stock Profile

Occupancy Classification		# of Occupancies
Group A	Assembly	72
Group B	Institutional	17
Group C	Single Family Detached	4,950
	Multi-unit Residential	575
	Seasonal Residential	18
	Hotel / Motel	1-4
	Mobile Homes & Trailers	0
	Other	5
Groups D & E	Commercial	386 + 35 Vacant Commercial Land
Group F	Industrial	122 + 35 Vacant Industrial Land
Other occupancies not classified in OBC such as farm buildings.		10
Totals		6620

*Information on mixed occupancy buildings not kept by the City.

Source: City of Brockville 2006 Community Profile

(1) Residential numbers from Statistics Canada 2006 Community Profile

Information Analysis and Evaluation

The data collected must be examined, evaluated and analyzed for the purpose of identifying potential fire risks (community fire profile) within the community. The development of a community profile and the identification of priorities source as the basis for selecting activities in the areas of public education and fire prevention, based upon local needs and circumstances.

Building Stock Profile Concerns

- The extreme age of downtown core buildings gives cause for concern for fire separations between adjoining buildings. Contractors have tendency to breach separations to run HVAC, plumbing pipes and electrical wiring during renovations & building upgrades, thereby increasing the chance of fire spread and smoke damage.
- The downtown core has many residential units situated above the main commercial/business units located at grade. The integrity of the fire separations between floors in these older buildings is questionable as well.
- Only a few downtown buildings have sprinkler systems, some only partially.
- Most of the industrial buildings are located in the north end of the city; however pockets of industrial usage are dispersed with other land uses throughout the city. Some are located beside schools, hospitals and residential areas.
- As larger industries employ over two hundred fifty employees, large fires in these buildings would have devastating impact on the community as well as the environment.

Municipal Fire Loss Profile

Municipal Fire Deaths and Injuries								
Occupancy Classification		2012		2013		2014		Total Deaths & Injuries
		Deaths	Injuries	Deaths	Injuries	Deaths	Injuries	
Group A	Assembly	0	0	0	0	0	0	0
Group B	Institutional	0	0	0	0	0	0	0
Group C	Residential	0	1	0	7	0	3	11
Groups D & E	Commercial	0	0	0	0	0	0	0
Group F	Industrial	0	0	0	0	0	0	0
Mobile Homes & Trailers		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other		0	0	0	0	0	0	0
Total Deaths/Injuries		0	1	0	7	0	3	11

Municipal Property Dollar Loss								
Occupancy Classification		2012		2013		2014		% of Total \$ Loss 2012-2014
		# of Fires	\$ Loss	# of Fires	\$ Loss	# of Fires	\$ Loss	
Group A	Assembly	0	\$0	2	\$5,500	0	\$0	<1%
Group B	Institutional	0	\$0	0	\$0	0	\$0	0%
Group C	Residential	6	\$86,000	16	\$370,410	18	\$1,482,000	81%
Groups D & E	Commercial	1	\$5,000	5	\$103,400	1	\$2,500	5%
Group F	Industrial	0	\$0	2	\$320,000	2	\$5,200	14%
Mobile Homes & Trailers		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other		3	\$2,500	1	\$200	0	\$0	<1%
Total Dollar Loss		\$10	\$94,100	\$22	\$799,510	\$21	\$1,489,700	\$2,383,310

*Source: OFM Data Services & CrySis Dispatch Records

Commentary on Simplified Risk Assessment

The 2016 Simplified Risk Assessment (SRA) provides a good basis for identifying the fire and life safety risks present in the City of Brockville. There are two areas of major concern noted in Brockville:

- The large number of buildings in the downtown area that date from the 1800 – 1900's are a source of serious concern that requires a high level of fire prevention activities as well as sufficient firefighting resources to minimize losses.
- The size of the population considered as vulnerable in case of fire is a serious risk that must be addressed in determining the level of fire protection. Within the City there are hospitals, senior's residences and community assisted living facilities. In addition the fire department is responsible for responding to three retirement residences and the Mental Health facility in Elizabethtown with hundreds of additional vulnerable individuals.

The Simplified Risk Assessment should be revised to include a section on "Priority Setting for Compliance" which establishes the priority for various building classifications for both fire prevention and public education activities. This section then provides the basis for developing a work plan to focus on those areas of greatest concern and identifies the solutions to be implemented. Once the 2016 Census date is available the SRA can be further updated with new population information.

RECOMMENDATIONS

19. It is recommended that the use of hand held devices for fire inspections be issued to improve efficiency in conducting inspections and preparing reports using software used by the Fire Prevention Division and be integrated with CriSys©.
20. It is recommended that the Fire Prevention Division utilize the Provincial Offences Act Part I for routine violations of the Ontario Fire Code covered by Schedule 17.4 with set fines. Serious or repeat violations would continue to be prosecuted under Part III of the POA.
21. It is recommended that the Fire Protection Agreement with Elizabethtown-Kitley be amended to recognize the involvement of the Fire Prevention Division in fire prevention activities related to the high risk occupancies covered in that area.
22. It is recommended that the Simplified Risk Assessment be revised to include a section on "Priority Setting for Compliance" which establishes the priority for various building classifications for both fire prevention and public education activities. Once current data on the number and classification of buildings by occupancy is known that a work plan is developed to establish the frequency of routine inspections for each classification.
23. It is recommended that a understanding be developed between the Fire Department and the Planning/Building Department(s) to specify the roles and responsibilities of those departments with respect to development and building activities. These include review by the Fire Prevention Division of Site Plans, Building Permit applications, and Occupancy permits. It is further recommended that a portion of the building/planning fees be allocated to the Fire Department in recognition of the plans review process.
24. It is recommended that in consideration of potential liability as well as mitigating costs Council consider adopting or reviewing the following by-laws:
 - Open Air Burning By-law
 - False Alarm By-law
 - Fire Route By-law
 - Fireworks By-law
 - Fire Prevention By-law

Emergency Management

As required by the *Emergency Management and Civil Protection Act* Council have adopted a Municipal "Emergency Response Plan" that provides direction and assigns responsibilities to departments/agencies in the event of a major emergency affecting the municipality. The Fire Chief is the designated Community Emergency Management Coordinator (CEMC) and the Deputy Chief is the Alternate CEMC and they play a key role in major emergencies as well as being responsible for the development and updating of the Emergency Plan, conducting training, coordinating with other agencies and private sector partners.

The Brockville Emergency Plan has been updated as of 2016 for contact information and appears to be comprehensive and well organized.

The Municipality has also conducted a Hazard Identification and Risk Analysis" (HIRA) is conducted annually and identifies the probability of hazards that could occur in the community.

The hazards can be classified in two major categories - those emergencies caused by Nature and those caused by Human Activities.

Some examples of hazards and emergencies caused by Nature are:

- Severe weather including blizzards, ice storms, tornados, floods, drought, etc.
- Earthquakes
- Pandemics or wide spread infectious disease outbreaks
- Forest fires

Some examples of hazards and emergencies caused by Human Activities are:

- Major fires and explosions
- Train derailments
- Hazardous Materials spills
- Failure of water supplies
- Electrical supply interruption – extended
- Pipeline rupture

The HIRA identifies weather related hazards that could occur in the community. In recent years the effects of global warming and extreme weather conditions from floods to droughts, wildfires, blizzards and ice

storms have become a significant factor in major emergencies across Canada and the U.S.

All municipal departments have important roles to carry out in the event of one of these incidents and coordination with other agencies, the province and federal government is an important consideration of mitigating the impact. The Ice Storm of 1998 is an example of an extreme emergency where all levels of government provided resources to local communities.

Transportation incidents involving Hazardous Materials (Dangerous Goods) are listed in the HIRA by mode of transport i.e. road, rail, marine and air. With pipelines running through the community carrying natural gas and petroleum products it is recommended that this mode of transportation of dangerous goods should be included in the HIRA.



With the large volume of rail traffic through the City and in light of the Lac Megantic disaster in 2013 and other derailment incidents involving dangerous goods, it is recommended that consideration be given to engaging with the railways to plan and conduct training for rail incidents which can have a significant impact due to the volume of dangerous goods being transported.

CN Manitoba Yard in Brockville

RECOMMENDATIONS

25. With the volume of rail traffic through the City and in light of the Lac Megantic disaster in 2013 and other derailment incidents involving flammable liquids, consideration be given to engaging with the railways to plan and exercise for rail incidents which can have a significant impact due to the volume of dangerous goods being transported.
26. It is recommended the City review and update the Water Emergency Response Plan Hazard Identification and Risk Analysis (HIRA)

Corporate Services

The Brockville Fire Department is one part of the corporate structure of the City of Brockville and together with other municipal departments they deliver services to the residents and businesses in the municipality, as directed by Council. The Chief Administrative Officer and members of the Senior Management Team (SMT) oversee the coordination of municipal service delivery, evaluate changing demands and circumstances and make recommendations to Council for their consideration on a wide variety of subjects. The Fire Chief, as part of the SMT, is actively involved not only for fire service matters but also provides input on other municipal issues as part of this multi-disciplinary team.

Some examples of the interdependent relationships between departments are:

- Public Works supports the Fire Service with providing fleet and facility maintenance, road conditions/closures, and other support as needed..
- Planning and Development department works closely with the Fire Service to review new development proposals, site and building plan reviews including fire protection requirements and also provides by-law services.
- Clerks department provides support for reports to Council, by-laws, and a variety of administrative requirements to all departments.

RECOMMENDATIONS

27. It is recommended that a review be completed in coordination of departments actively relating to the by-laws that are enforceable by different departments or services.

Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis

As part of the review of the Brockville Fire Department a “*Strengths, Weaknesses, Opportunities, Threats (SWOT) Analysis*” was carried out. A questionnaire with 20 questions was distributed to department members to provide an opportunity for individuals to comment on their concerns and views on various areas within the department. Questions were in a yes/no format and narrative format. The results of the survey assisted in the development of the recommendations for the Master Fire Plan, as well as providing the Fire Chief information for future strategic planning.

The participation in the SWOT analysis exceeded expectations. The strengths outweigh the weaknesses; the team is hardworking, dedicated, professional, caring and effective.

RECOMMENDATIONS

28. It is recommended the Fire Chief and Senior Officers review the results of the SWOT Analysis and consider each comment/suggestion submitted to determine how and if it should be incorporated in future department planning.

RECOMMENDATIONS – Summary

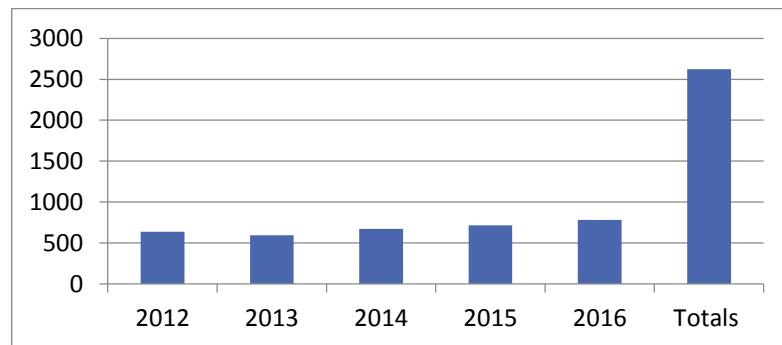
1. It is recommended that the 1987 Establishing and Regulating By-law (012- 87) be updated to a more current version and include a list of Council authorized services for both emergency responses and fire prevention activities. It should also clarify levels of service delivery, as well as incorporate any changes in legislation/regulation (e.g. carbon monoxide detectors, mandatory inspection of vulnerable occupancies, etc.)
2. It is recommended that a procedure be developed to review and update/rescind or develop new Standard Operating Guidelines (SOG's) to ensure they reflect current policies and Council direction as well the FPPA, OH&S and other legislation that may apply.
3. It is recommended that the Fire Department provide an Annual Report to Council to detail the activities and work of the department and identify benchmarks for key activities.
4. It is recommended that the City request a new Fire Protection Survey be conducted by the Fire Underwriters Survey (FUS) to update the current grading schedule and provide information on the potential financial impact of various classification changes to residents and businesses in Brockville.
5. It is recommended that the Automatic Aid Agreement with Elizabethtown-Kitley be reviewed to consider all the various factors that are associated with this agreement including:
 - Impact on fire protection coverage within the City of Brockville when the fire department is committed to a call in the agreement area
 - The level of service provided in the agreement area in comparison to the level of fire protection service in other parts of Elizabethtown-Kitley
 - The costs associated with provision of this service and fees being charged that should reflect the actual cost to the City of Brockville.
 - Options for various service delivery models that could reduce risks and provide appropriate fire protection and mitigate costs.
 - Other factors in the relationship between these two municipalities that may be considered: It is recommended that the Fire Department budget should reflect the actual cost of services provided to Elizabethtown-Kitley.

6. It is recommended that the department continue to operate the Fire Dispatch Services for the municipalities and its own needs while pursuing opportunities to augment its clientele base on a reasonable net cost.
7. It is recommended that the department continue to expand and integrate the *CriSys*® Computer Aided Dispatch System with other functions such as paging, fire prevention records and similar applications to more fully enhance both dispatching and department records management system.
8. It is recommended that Brockville Fire Department continue to develop partnerships with other fire departments to share in training courses and instructors as an effective means to conduct training activities.
9. It is recommended that the department expand the use of computer based on-line training for the theory portion of many courses. This will assist in allowing firefighters to study and complete assignments at times that are convenient for them. It will also allow trainer/facilitators to focus on practical “hands-on” training.
10. It is recommended that all crews conduct reviews/training on department SOG’s, in increments during the year, to ensure members are familiar with the content and understand their roles and responsibilities.
11. It is recommended that discussions be undertaken with the Brockville Professional Fire Fighters Association to address the need to improve the ability of the department to quickly have additional firefighters available for call-back for major fires and emergencies and also when the on-duty crews are dispatched out of the City for responses.
12. The addition of full time casual and volunteer firefighters should be initiated to augment the current staffing with the goal of meeting adequate on scene staffing levels.
13. With the recent changes made to the fleet composition as a result of the Fire Chief’s 2016 report to Council it is recommended that this fleet plan continue to be supported.
14. It is recommended that the cooperative arrangement between the Fire Department and Fleet Services division for vehicle procurement and servicing be continued.

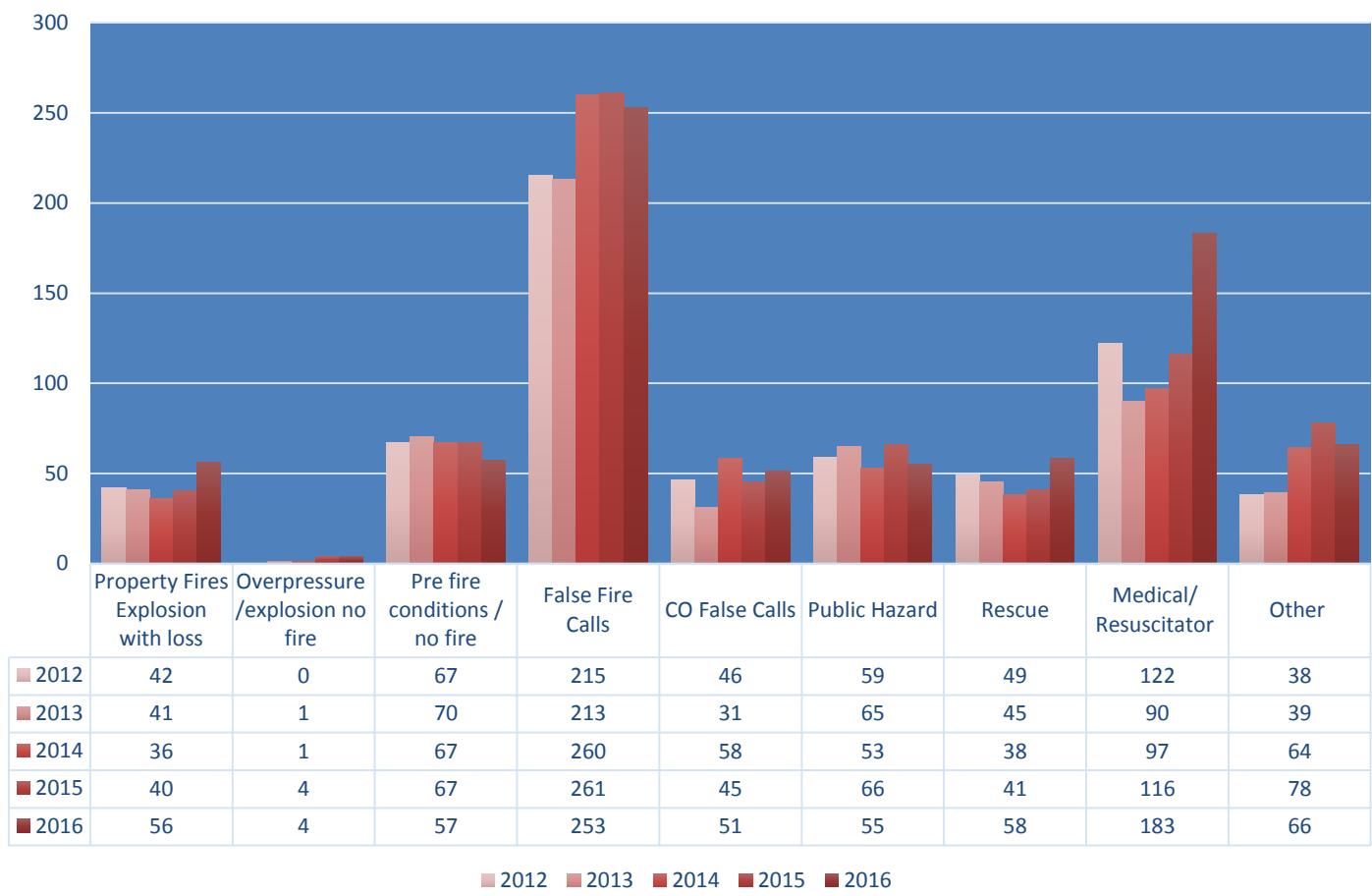
15. It is recommended that in any area of the City where fire flows are limited or unavailable, the department request water tankers from Elizabethtown-Kitley as part of the initial dispatch.
16. It is recommended that the Environmental Services Department consider having a Water Supply Master Plan developed to help identify areas for improvement and long term capital budget requirements.
17. It is recommended that areas of low fire flow (Red hydrants) be identified and a plan implemented to undertake renewal and replacement of undersized pipes and dead end lines, etc.
18. It is recommended that any new development areas conform to the requirements of the Official Plan with respect to water supply and hydrants for fire flows as established by the Fire Underwriters Survey.
19. It is recommended that the use of hand held devices for fire inspections be issued to improve efficiency in conducting inspections and preparing reports using software used by the Fire Prevention Division and be integrated with CriSys©.
20. It is recommended that the Fire Prevention Division utilize the Provincial Offences Act Part I for routine violations of the Ontario Fire Code covered by Schedule 17.4 with set fines. Serious or repeat violations would continue to be prosecuted under Part III of the POA.
21. It is recommended that the Fire Protection Agreement with Elizabethtown-Kitley be amended to recognize the involvement of the Fire Prevention Division in fire prevention activities related to the high risk occupancies covered in that area.
22. It is recommended that the Simplified Risk Assessment be revised to include a section on "Priority Setting for Compliance" which establishes the priority for various building classifications for both fire prevention and public education activities. Once current data on the number and classification of buildings by occupancy is known that a work plan is developed to establish the frequency of routine inspections for each classification.

23. It is recommended that a understanding be developed between the Fire Department and the Planning/Building Department(s) to specify the roles and responsibilities of those departments with respect to development and building activities. These include review by the Fire Prevention Division of Site Plans, Building Permit applications, and Occupancy permits. It is further recommended that a portion of the building/planning fees be allocated to the Fire Department in recognition of the plans review process.
24. It is recommended that a understanding be developed between the Fire Department and the Planning/Building Department(s) to specify the roles and responsibilities of those departments with respect to development and building activities. These include review by the Fire Prevention Division of Site Plans, Building Permit applications, and Occupancy permits. It is further recommended that the Fire Department be compensated for the work undertaken as part of the Planning or Building fees being collected.
25. It is recommended that in consideration of potential liability as well as mitigating costs Council consider adopting or reviewing the following by-laws:
 - Open Air Burning By-law
 - False Alarm By-law
 - Fire Route By-law
 - Fireworks By-law
 - Fire Prevention By-law
26. It is recommended the City review and updates the Water Emergency Response Plan Hazard Identification and Risk Analysis (HIRA)
27. It is recommended that a review be completed in coordination of departments actively relating to the by-laws that are enforceable by different departments or services.
28. It is recommended that a review be completed on by-laws that are enforceable by different departments or services.
29. It is recommended the Fire Chief and Senior Officers review the results of the SWOT Analysis and consider each comment/suggestion submitted to determine how and if it should be incorporated in future department planning.

Performance Measures



Brockville Emergency Calls by Type 2012 - 2016



Legislation Affecting the Ontario Fire Service

LEGISLATION	AREAS OF SCOPE / CONCERN
Fire Protection and Prevention Act, 1997 and Ontario Fire Code	Mandates and authorizes both the OFM and municipalities. Part IX is generally the responsibility of the Ministry of Labour, except where terms and conditions in collective agreements may adversely affect the provision of fire protection.
Provincial Offences Act	Assistants to the Fire Marshal are provincial offences officers under the act for the purpose of smoke alarm related offences.
Municipal Act, 2001	Authorizes the passing of bylaws necessary for the provision of fire protection
Occupational Health and Safety Act and regulations	Human resources Occupational health & safety
Ontario Regulation 211/01 Propane Storage and Handling, O. Reg. 440/08	Requires propane operators to obtain fire department approval for Risk and Safety Management Plans. The fire department approves fire safety, fire protection and emergency preparedness elements of the RSMPs.
Environmental Protection Act	Requires fire department personnel to report spills to MOE
Dangerous Goods Transportation Act	Governs the transportation of dangerous goods
Emergency Management and Civil Protection Act	Requires municipalities to have an emergency plan and a trained community emergency management coordinator and to conduct exercises
Building Code Act	Provides authority for municipalities to appoint certain fire personnel as building inspectors
Highway Traffic Act	Governs operation of fire vehicles during emergency response. Governs the response of firefighters on roads that have been closed by police, the use of flashing green lights on firefighters' personal vehicles, and controlling traffic at accident scenes.

Forest Fire Prevention Act	Applies only to "Fire Regions" as defined in the act. Controls outdoor fires in "Restricted Fire Zones". It requires municipalities to extinguish grass, brush or forest fires within their limits. Provides authority for appointment of "Wardens" and "Officer" by the Minister. Also Regulation 207/96 controls outdoor fires outside of restricted fire zones
Development Charges Act	Provides the authority for portions of development charges to be allocated to fire services
Coroners Act	Regulates the control of bodies. Authorizes/regulates coroner's inquests and coroner's inquest recommendations
Day Nurseries Act	Defines the approvals from the fire chief that are required to operate a daycare facility
Employment Standards Act	Human resources
Human Rights Code	Defines how boards of inquiry, complaints, discrimination and enforcement are to be handled
Labour Relations Act	Human Resources
Municipal Freedom of Information and Protection of Privacy Act	To provide access to information held by institutions and to protect the privacy of individuals with respect to personal information about themselves held by institutions
Pesticides Act	Makes mandatory the reporting of wholesale and retail pesticides to the fire department
Workplace Safety and Insurance Act	Legislated requirement to report accidents and provide and document training Presumptive legislation

Consultation List

Mayor – David Henderson

Councillor – David LeSueur

Councillor – Tom Blanchard

Councillor – Jeff Earle

Councillor – Phil Deery

Councillor – Lee Bursey

Councillor – Jason Baker

City Manager – Bob Casselman

Director of Corporate Services – David Dick

OFMEM Advisor – Scott Hayes

Chief Fire Prevention Officer – Greg Healy

Training Officer – Kyle Karasiuk

Fire Prevention Officer – Matt Tyo

Environmental Services – Peter Raabe

Chief Operator, Water Systems – Jason Barlow

Economic Development – Dave Paul

Retired Chief – Harold Tulk

Retired Chief – Harry Jones

Brockville Professional Firefighters Association – Ryan Wells, Doug Pert, Travis Brennan, Mark Jones, Scott Hayward

January 8, 2018

**REPORT TO FINANCE, ADMINISTRATION, OPERATIONS COMMITTEE – JANUARY
16, 2018**

**2018-003-01
WATER & WASTEWATER
SYSTEMS QUARTERLY REPORT
(OCT. – DEC. 2017)**

**PETER RAABE, P. ENG.
DIRECTOR OF ENVIRONMENTAL SERVICES
ED MALCOMSON
SUPERVISOR – WASTEWATER SYSTEMS
DON RICHARDS
SUPERVISOR – WATER SYSTEMS**

RECOMMENDED

THAT Report 2018-003-01 Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017) be received for information purposes.

PURPOSE

This report covers the months of October, November and December 2017. The intent of the report is to keep the Committee, Council, and the public current with performance and major operational aspects of the Water Treatment Plant, Water Distribution System, Water Pollution Control Centre (wastewater treatment system), and Wastewater Collection System, including any notable highlights, MOECC inspections and adverse conditions.

BACKGROUND

This report is submitted quarterly, and represents the fourth quarter of 2017.

ANALYSIS/OPTIONS

A. WATER TREATMENT PLANT AND WATER DISTRIBUTION SYSTEM

The City continues to be in compliance with the Water Treatment Plant's Municipal Drinking Water Licence and Drinking Water Works Permit, in addition to the Ontario Safe Drinking Water Act and Regulations. Please refer to Attachment #1 – Brockville Drinking Water System Performance Assessment Report to review the treatment and bacteriological sampling results.

Adverse Water Quality Incidents: No incidents to report

2018-003-01

Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 2****Items of Note:****1. Flows - Water Treatment Plant**October

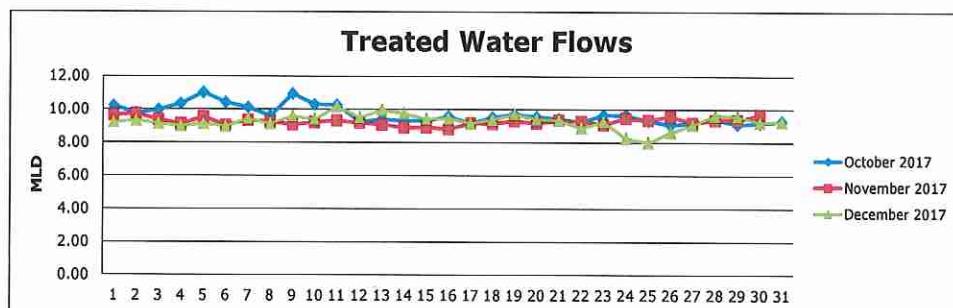
Total Volume Treated: 300.002 ML
 Average Daily Flow: 9.677 ML/d
 Average F12 Residuals: 0.58 mg/l
 Distribution Free Cl2 Res: Min 0.47, Max 2.01, Avg 1.43 mg/l

November

Total Volume Treated: 277.666 ML
 Average Daily Flow: 9.256 ML/d
 Average F12 Residuals: 0.60 mg/l
 Distribution Free Cl2 Res: Min 0.78, Max 2.07, Avg 1.43 mg/l

December

Total Volume Treated: 287.109 ML
 Average Daily Flow: 9.261 ML/d
 Average F12 Residuals: 0.56 mg/l
 Distribution Free Cl2 Res: Min 0.70, Max 2.01, Avg 1.45 mg/l

**2. Main Treatment Plant**

- Main plant diesel #2 gland water supply line was repaired
- Engineering work commenced for backwash wastewater transfer system

3. Booster Stations and Parkedale Reservoir:

- PAX mixer failed, new mixer ordered and installed

2018-003-01

Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 3****Flows - Parkedale Reservoir**October

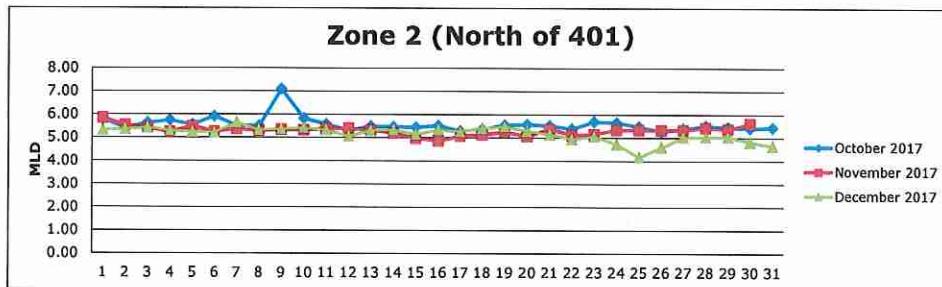
Total Flow Zone 2: 172.571 ML
 Average Daily Flow: 5.566 ML/d

November

Total Flow Zone 2: 158.832 ML
 Average Daily Flow: 5.294 ML/d

December

Total Flow Zone 2: 159.413 ML
 Average Daily Flow: 5.142 ML/d

**Flows – First Avenue Booster Station**October

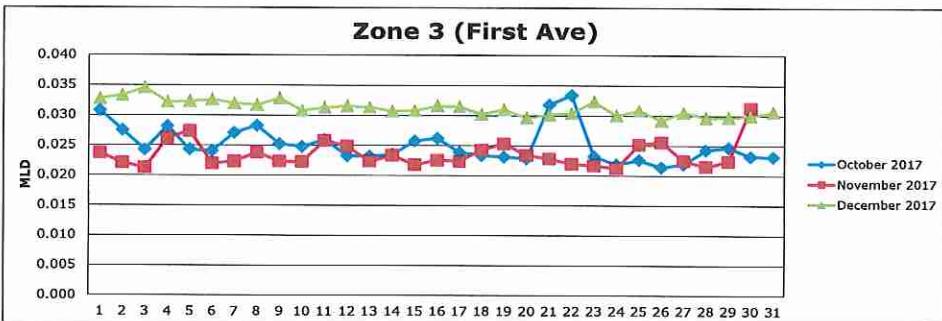
Total Flow Zone 3: 0.775 ML
 Average Daily Flow: 0.025 ML/d

November

Total Flow Zone 3: 0.703 ML
 Average Daily Flow: 0.023 ML/d

December

Total Flow Zone 3: 0.966 ML
 Average Daily Flow: 0.031 ML/d



2018-003-01

Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 4**

4. Filters:
 - Nothing to report
5. Overhead Tank:
 - Mixer repaired and is operational
 - Safety upgrades completed (Capital)
6. Low Lift Pump Station:
 - New PLC installation completed (Capital)
7. Drinking Water Quality Management System:
 - Essential supply service agreements sent to suppliers
 - Hazard Identification and Risk Analysis conducted by Workplace Safety & Prevention Services (see Attachment #2)
 - 2nd Management Review Meeting was held on December 7th, 2017 (see Attachment #3)
8. MOECC Inspections:
 - Report received for Brockville annual inspection conducted on June 27th, 2017 (see Attachment #4)
9. Regulatory Updates:
 - No updates to report
10. Regulatory Sampling:
 - All regulatory weekly bacti sampling for Brockville and Elizabethtown-Kitley completed
 - All regulatory quarterly sampling for THM's Nitrate, Nitrite for Brockville and Elizabethtown-Kitley completed
 - Regulatory lead sampling completed for Brockville and Elizabethtown-Kitley
11. Trunk Water Distribution:
 - Feedermain shutdown Charles Street to North Augusta Road for Bartholomew Street connection - Brockville General Hospital backfed during shutdown
 - Emergency repair completed on 400 mm feedermain on Perth Street
12. Elizabethtown-Kitley Distribution:
 - Lead sampling completed and report submitted to MOECC
 - Communication failure to Lily Bay Booster Station, Pribusin units replaced

2018-003-01

Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 5****Flows - Elizabethtown-Kitley****October**

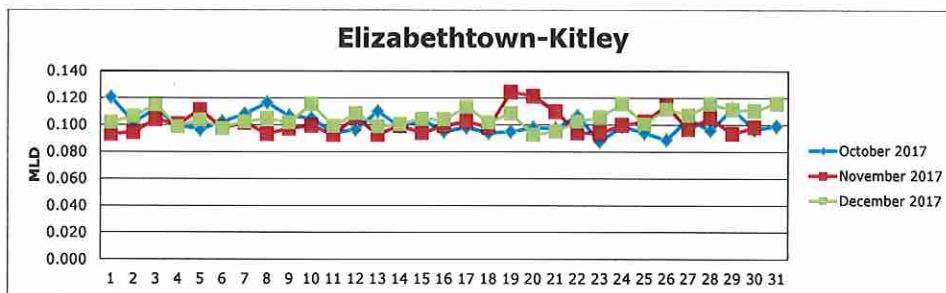
Total flow: 3.125 ML
 Average daily flow: 0.101 ML/d

November

Total flow: 3.023 ML
 Average daily flow: 0.101 ML/d

December

Total flow: 3.262 ML
 Average daily flow: 0.105 ML/d

**13. Local Water Distribution:**

- Service Calls

October (total 30 service calls)

- 0 bleed valves
- 19 curb stop repairs
- 0 Fire Dispatch
- 0 general inquiries
- 0 hydrant repairs
- 5 other inquiries
- 0 valve repairs
- 1 water main break inquiry
- 3 water meter/inside valve leaks
- 2 water quality complaints (dirty water/low pressure)

November (total 41 service calls)

- 0 bleed valve
- 19 curb stop repairs
- 0 Fire Dispatch
- 1 general inquiry
- 3 hydrant repairs
- 5 other inquiries
- 1 valve repair

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Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 6**

- 3 water main breaks
- 3 water meter/inside valve leaks
- 6 water quality complaints (dirty water/low pressure/no water)

December (total 149 service calls)

- 113 bleed valves
- 10 curb stop repairs
- 0 Fire Dispatch
- 0 general inquiries
- 3 hydrant repairs
- 9 other inquiries
- 1 valve repair
- 4 water main breaks
- 1 water meter/inside valve leak
- 8 water quality complaints (dirty water/low pressure/no water)

- **Watermain Breaks:**

October

- Laurier Boulevard and California Avenue – 300 mm DIP corrosion hole

November

- No breaks to report

December

- Perth Street – 400 mm CI shear (Feedermain)
- Manor Drive – 150 mm CI shear
- Riverview Drive – 150 mm CI shear

- **Flushing Program:**

- Annual distribution flushing program commenced

- **Service Repairs/Replacement:**

- 41 Perth Street
- Service bleed valve activation for winter

- **Valves/Hydrant Inspection/Leak Detection:**

- 654 hydrant inspections completed to date

- **Capital Projects WD:**

- Bartholomew Street, the watermain portion of the project has been completed
- Schofield Avenue project postponed until spring 2018
- Stewart Boulevard extension completed
- Aspen Drive extension completed

2018-003-01

Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 7****B. WASTEWATER TREATMENT PLANT AND COLLECTION SYSTEM**

The plant is currently meeting or exceeding all MOECC effluent discharge requirements and the fourth quarter Effluent Acute Toxicity test was completed with 0% Rainbow Trout mortality and 0% Daphnia Magna mortality. MOECC Regulations regard ≤ 50% mortality to be a pass.

Please refer to Attachment #5 – Brockville WPCC Sewage Plant Performance Assessment Report for all Operational Data for the quarter.

Items of Note:**1. Main Plant:**

- Primary Clarifiers 3 and 4 are online
- Primary Clarifiers 1 and 2 are currently not in use (on standby)
- Secondary Clarifiers 1 and 2 are online
- Secondary Clarifier 3 is currently not in use (on standby)
- 2017 3rd Quarter Federal Wastewater Systems Effluent Regulations (WSER) Report submitted to Environment Canada
- Digester #2 cleaned, inspected, pressure tested and back online (Capital)
- EVB Engineering has been contracted for engineering services regarding aeration tank repairs that will be completed in the spring of 2018 (Capital)
- Backflow inspector was on site to perform an audit on the City's backflow provisions at the WPCC, Main Pumping Station and remote facilities
- WPCC Staff responded to two (2) call-ins related to high rain and high flow conditions
- WPCC Staff responded to eight (8) call-ins related to mechanical/process issues
- WPCC Staff responded to fourteen (14) call-ins related to electrical/control issues

2. Main Pumping Station:

- Bypasses:
 - On October 30th, 2017 there was a 14 hour and 54 minutes bypass at the Main Pumping Station due to heavy precipitation. Approximate volume of the bypass was 47,525 m³. MOECC was notified of the event. Chlorination was established and samples taken.
- The 8" bypass valve is leaking and can't be taken out of service for repair without incurring a bypass
- The City has received confirmation from CWWF that funding for the design of the Main Pumping Station has been approved
- City staff along with Pure Technologies continuing to plan for the forcemain condition assessment - City staff are working on the logistics of facilitating the assessment (Capital)

2018-003-01

Water & Wastewater Systems Quarterly Report (Oct. – Dec. 2017)**Page 8****3. Pumping Stations:**

- WPCC Staff responded to thirteen (13) mechanical/equipment and communication problems
- New Flygt pumps for Riverview and Oxford pumping stations have been installed and are in service - pumps for Georgina pumping station still need to be installed (Capital)
- Meltric electrical emergency generator plug upgrades nearing completion (Capital)
- Wet well cleanouts completed at Oxford and Central pumping stations

4. Power Outages:

- There were two (2) power outages - no issues to report

5. Wastewater Collection System:

- 61 blocked sewer/camera inspections
- 5 sanitary sewer lateral dig-ups and repairs
- 0 blocked mains

POLICY IMPLICATIONS

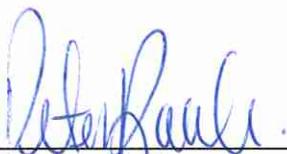
No policy implications at this time.

FINANCIAL CONSIDERATIONS

No financial considerations at this time.

CONCLUSION

It is recommended that Council receive the report for information purposes.



P. Raabe, P. Eng.
Director of Environmental Services



E. Malcomson
Supervisor – Wastewater Systems



D. Richards
Supervisor - Water Systems

B. Casselman
City Manager

**BROCKVILLE DRINKING WATER SYSTEM
PERFORMANCE ASSESSMENT REPORT**

Month 2017	CITY OF BROCKVILLE				ELIZABETHTOWN-KITLEY		BACTERIOLOGICAL SAMPLING		
	Total Volume Treated (ML)	Avg. Daily Flow (ML/d)	Avg. F12 Residual (mg/L)	WDS Avg. FCR (mg/L)	Total Flow (ML)	Avg. Daily Flow (ML/d)	BROCKVILLE WDS		
							EC	TC	HPC
OCT	300.00	9.68	0.58	1.42	3.13	0.10	45	45	20
							45 out of 45 safe	45 out of 45 safe	20 out of 20 safe
NOV	277.67	9.26	0.60	1.43	3.02	0.10	36	36	16
							36 out of 36 safe	36 out of 36 safe	16 out of 16 safe
DEC	287.11	9.26	0.56	1.45	3.26	0.11	36	36	16
							36 out of 36 safe	36 out of 36 safe	16 out of 16 safe

FCR - Free Chlorine Residual

WDS - Water Distribution System

EC - E. coli

TC - Total Coliform

HPC - Heterotrophic Plate Count

ML - Million Litres

ATTACHMENT #2



CONSULTING
SERVICES



**Hazard Identification and
Risk Analysis Report**

**BROCKVILLE WATER
TREATMENT FACILITY**

**20 River Ave.,
Brockville, ON
K6V 7A5**

**Alison Beer
Consultant
WSPS**

November 2017



ATTACHMENT #2

**Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT**

STATEMENT OF LIMITATIONS

The results of this report present a baseline Hazard Identification and preliminary Risk Analysis (HIRA) assessment of activities at the Brockville Water Treatment Facility. This report reflects the site conditions as they existed at the date and time of the site visit as well as input provided by staff.

The consultant does not infer that there are no other occupational health and safety concerns at this workplace. Regular workplace inspections and good communication with employees at this location is imperative to ensure identification of any new hazards that may be introduced into the workplace. The evaluation and ongoing determination of effectiveness for hazard controls referenced herein remains the responsibility of the employer as part of their broader hazard management activities within their Occupation Health and Safety Program.

The information contained in this report is current to the best of WSPS' knowledge as at the date of the site visit. No warranty, guarantee, or representation is made by WSPS as to the absolute correctness or sufficiency of any representation contained in this report. WSPS assumes no responsibility in connection therewith; nor can it be assumed that all acceptable safety measures are contained in this report, or that other or additional measures may not be required in particular or exceptional conditions or circumstances. Under no circumstances shall WSPS, its affiliates, or any of its respective partners, officers, directors, associates, agents or representatives be liable for any damages, whether direct, indirect, special or consequential damages for lost revenues, lost profits, or otherwise, arising from or in connection with this report.



ATTACHMENT #2

Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

About Workplace Safety & Prevention Services

At Workplace Safety & Prevention Services (WSPS), we partner with you to make the best of your employees, your reputation and your business. We'll make sure that every dollar you invest in health and safety gets you multiple returns, and ultimately, helps you grow the life of your business. We collaborate with you to develop programs that will help you achieve and maintain the highest standards of health and safety. We provide comprehensive training, information and consulting services that will assist you in integrating safe work habits into your normal business practices and culture, thus enabling your employees to successfully deliver on your business objectives. Our highly experienced consultants understand your needs, can quickly identify cost-effective solutions and offer expert advice that will facilitate the implementation of your health and safety initiatives.

EXECUTIVE SUMMARY

Alison Beer, WSPS Consultant, visited the Brockville Water Treatment Facility on November 13, 2017 and attended to a local water main project, as well as the Parkdale Pumping Station to make observations of the workplace(s) and gather the data necessary to complete this Hazard Identification and Risk Analysis (HIRA).

Working together with competent workplace representatives, a determination of major tasks for each occupation were identified in order to determine likely and reasonably foreseeable hazards that a worker would be exposed to while performing the occupation.

The occupations evaluated included:

Supervisor-Water Systems	Chief Operator-Foreman
Operator – Treatment	Operator – Distribution
Maintenance Mechanic	

A list of occupational task based hazards was created for each occupation and resultant risks were evaluated in order to determine risk exposure values.

The WSPS process considers estimation of risk in two (2) separate stages, in order to provide a dashboard view of resultant risk reduction efforts currently in place. These stages include;

- 1) Estimated Risk levels prior to hazard controls (expressed herein as *intrinsic risk*), and
- 2) Estimated Risk levels considering hazard controls (expressed herein as *controlled risk*).



ATTACHMENT #2

**Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT**

The overall objective of this preliminary risk analysis was to identify occupational task based hazards and assess resultant risks so that existing protective measures can be identified and/or applied on a move forward basis to further reduce risk. HIRA is a recognized fundamental step in the hazard management process.

The results of this HIRA work have been provided in an electronic (MS Excel) HIRA inventory file.

WSPS encourages the Brockville Water Treatment Facility to consider how the findings of this report can further your Occupational Health and Safety Program objectives and the provision of a healthy and safe workplace. It remains the responsibility of your organization to determine acceptable levels of risk reduction are achieved, and that risk controls are continuously verified as remaining in place and validated as effective.

SUMMARY OF KEY FINDINGS

The WSPS Consultant reviewed a total of 5 major occupations, identified 64 occupational health and safety hazards and conducted a preliminary risk analysis of these hazards.

Risks were assessed prior to (intrinsic) and post (residual) hazard controls in order to determine the current state of overall prevention and risk reduction efforts present at the workplace. The degree of prevention success and risk reduction efforts is represented by Table 1 below.

Generally speaking the dashboard should show an effective reduction in risk when comparing the intrinsic to the controlled risk. In fact, after controls were considered, there were no Extreme hazards remaining.

Table 1



ATTACHMENT #2



Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

Further detailed risk reduction recommendations are contained in this report, specifically in the electronic hazard and risk repository file found in the electronic file.

Opportunities for Improvement

- 1) On the day of the site visit, it was observed that 5 workers were working on a project in the community without supervision. This is contrary to Section 14 (1)(2) of O. Reg. 213/91 Regulations for Construction Projects which requires that the *Constructor appoint a supervisor for every project in which 5 or more workers will work at the same time*. This includes contractor/subcontractor workers, in this case, the backhoe operator. It is recommended that the Brockville Water Treatment Facility ensures that competent supervision is available at all construction projects where 5 or more workers are working at the same time as per S. 14(1)(2) of O. Reg. 213/91. NOTE: Section 14(2) states that *the supervisor shall supervise the work personally at all times either personally or by having an assistant, who is a competent person, do so personally.*³
- 2) Manual / mechanical material handling of the summer coagulant and hydrofluorosilicic acid remain high risk hazards despite the considerations of controls that have been implemented. It is recommended that the facility consider alternative engineering controls to reduce the risk of worker exposure to manually / mechanically handling chemical containers associated with these chemicals.
- 3) The permanent fixed anchor points on the flat rooftop have not been inspected by a competent person on an annual basis as recommended in CSA Standard Z91 clause 7.2.4. It is recommended that the employer ensure these fixed anchor points are inspected to ensure their integrity when in use by workers.
- 4) It is recommended all fixed access ladders under the control of the Brockville Water Treatment Facility be inspected by a competent person on annual basis for rust, corrosion and structural integrity as per MOL Data Sheet 02-4 Fixed Access Ladders. This includes the fixed access ladders at the Parkedale Pumping Station.
- 5) It is recommended that Safe Work Practices be developed and communicated to staff on the following topics:
 - Safe Use of Ladders
 - Safe Driving
 - Safe Use of Hiab Crane



ATTACHMENT #2

Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

- Safe Use of Hand & Power Tools
 - Working in Extreme Temperatures
 - Working Alone
 - Safe Use of Chain Hoists
- 6) It is recommended that a rescue plan be developed for instances where a worker may fall and be arrested by a fall arrest system.
- 7) Risk of musculoskeletal injuries from prolonged sitting at a computer, manual exertions from working with hand tools (shovels, wrenches, valve keys etc.), and working in awkward postures are prevalent in all occupations. It is recommended that a stretch program be considered to reduce the risk of sprains and strains.
- 8) Most staff deal with the general public during the course of their work, either on the phone or in person. Interactions are commonly due to complaints. It is recommended that all public facing staff receive training on how to deal with difficult people.

CONCLUSIONS

The results of this report can be used to improve your current health and safety program. All hazards in this report should be reviewed by management in conjunction with the Joint Health and Safety Committee to determine if existing controls are sufficient or if improvements can be made to the workplace. At a minimum, any High-risk hazards identified, as a result of this survey, should be evaluated to reduce risk. Hazard controls should be implemented as soon as possible.

The organization has many strengths that are worth noting. Having a QMS in place that is audited every 3 years is commendable. There are also a host of SOP's that are reviewed annually and workers are trained yearly. Good housekeeping practices within the facility are also notable.



ATTACHMENT #2

**Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT**

The Brockville Water Treatment Facility is required to ensure that all workers understand the hazards in their workplace. The results of this assessment can be used for this purpose. The hazards identified as a result of this report should be included in any orientation/refresher training, and considered in the development of roles and responsibilities for the organization, or in their application to future revisions of the health and safety program. By following this approach, the Brockville Water Treatment Facility will ensure an integrated health and safety program. This type of management program has been proven effective in ensuring the long term sustainability of your health and safety efforts.

CONTACT INFORMATION

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Consultant
Workplace Safety & Prevention Services
Email: alison.beer@wsp.ca
613-612-3440



**Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT**

APPENDIX A

The Hazard Management Process

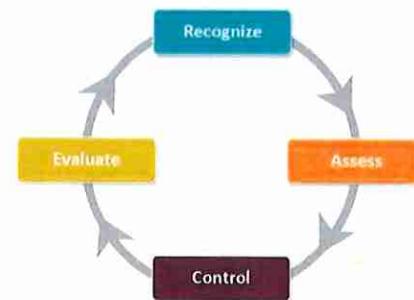
As part of an effective Hazard Management Program, employers commonly establish, conduct, and document HIRA activities. In Canada, good industry practice for effective hazard management is established by CSA Z1002 -12.

Effective hazard management programs set a foundation for due diligence and ensures an employer that they are taking reasonable steps to mitigate risks to a level deemed acceptable to the organization.

Generally speaking, hazard management is a continuous improvement process represented by four key steps, namely Recognize, Assess, Control and Evaluate (R.A.C.E.). This process is commonly used when identifying hazards and evaluating related risks in order to selecting the most appropriate and effective methods of control. Represented as a closed loop process, ongoing hazard monitoring and evaluation of controls leads to continuous improvement when warranted. The HIRA work performed by WSFS is a recognized preliminary and fundamental step in the hazard management process.

Effective hazard management programs aid employers and their employees as it results in systematic and detailed organizational knowledge of major occupations, the work areas and work process necessary to:

- Identify hazards and eliminate the hazard (if possible)
- Assess risks, where the hazard cannot be eliminated
- Understand the consequences of those risks
- Review the adequacy of existing hazard controls and determine where improvement may be necessary on an ongoing basis.



The R.A.C.E. process sets out a simple framework for employers to manage risks in a proactive and sustainable manner.

ATTACHMENT #2

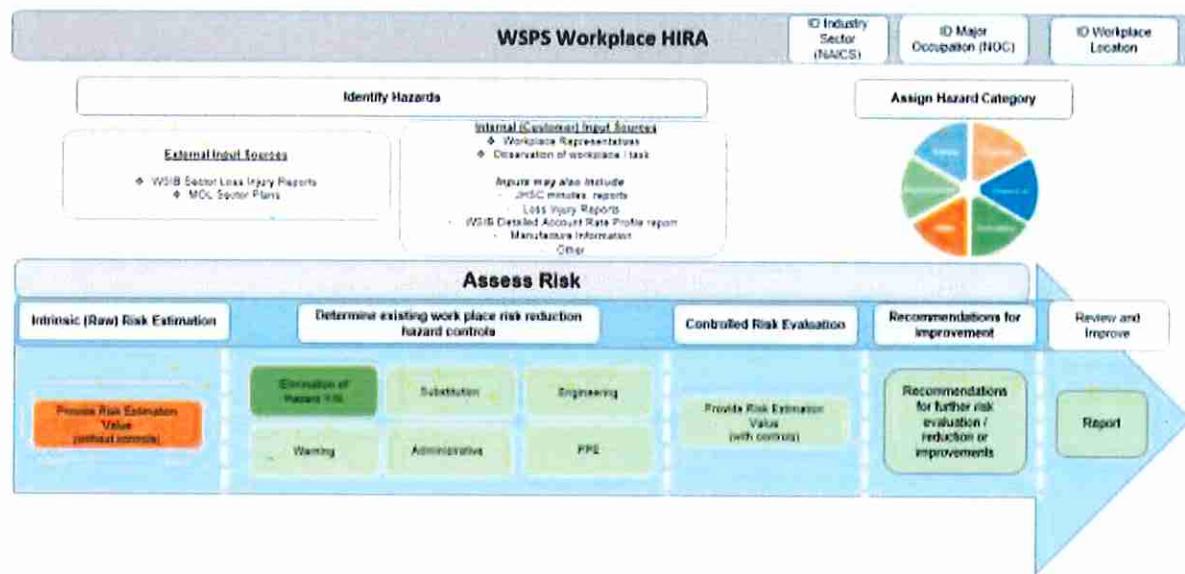


Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

WSPS - HIRA Approach

The approach taken in the provision of this service is depicted in Figure 1 below and is consistent with good industry practice and *CSA Z1002 -12 – “Occupational health and safety - Hazard identification and elimination and risk assessment and control.”*

Figure 1 – WSPS HIRA Process



HAZARD IDENTIFICATION

A *hazard* is defined as a potential source of harm to a worker.

For the purpose of this report, in order to identify occupational health and safety hazards that personnel may be exposed to, WSPS considered a variety of external and internal (customer) inputs.

External Hazard Identification Input Sources

Key external inputs considered as part of the hazard identification phase of this work included:

- Government of Canada [National Occupational Classification](#) System - 2011



Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

To supplement this information, WSPS also considered the following information:

Legislated limits

Ministry of Labour (MOL) [Guidelines](#)

Voluntary technical standards (e.g. CSA, ULC)

Internal (Customer) Hazard Identification Input Sources

WSPS worked in consultation with key workplace representatives to identify core work activities performed by staff during the course of their employment and the hazards that these personnel are exposed to.

Once identified and in alignment to CSA Z 1002-12 the hazards in this report are described within the following major categories:

- Physical
- Chemical
- Biological
- MSDs
- Psychological
- Safety



RISK ANALYSIS

Risk is defined as the combination of the likelihood of the occurrence of a harm (herein referred to as *probability*) and the severity of that harm. Simply stated risk is the likelihood that a hazard will cause injury or illness should an accident occur and a determination of how severe the loss will be.

Following the identification and categorization of a hazard, a preliminary risk analysis has been completed for each hazard.

ATTACHMENT #2



Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

Five factors that contribute to risks include:

- People
- Environment
- Equipment
- Process
- Materials

There are several risk predictors that point to opportunities for harm or loss. The WSPS risk analysis process involves a qualitative risk assessment model which considers risk estimation in two (2) separate stages:

1. Intrinsic Risk - Estimated risk levels prior to establishing hazard controls, and
2. Controlled Risk - Estimated risk levels considering hazard controls.

The WSPS Risk Analysis Model is outlined in greater detail in APPENDIX B. Risk is represented in four (4) categories outlined below.

Table 2 – WSPS Risk Categories

Risk (R) Categories	
Very High / Extreme = R1 to R3	An imminently hazardous situation, where there are no hazard controls present or a failure in existing hazard controls. Such a situation may pose an immediate danger. Hazard elimination, immediate and/or interim hazard controls should be established without delay. Further detailed analysis and control planning may be required.
HIGH = R4 to R8	A serious or significant hazard -- a high priority for elimination, immediate and/or interim controls where further detailed analysis and control planning is required.
MEDIUM = R9 to R15	Moderate hazard – medium or next priority for controls and/or more detailed analysis as soon as possible
LOW = R16 to R25	Minor hazard -- lower priority for additional controls or hazard analysis while existing controls are maintained and monitored for success.

Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

Hazard Control Recommendations

This report has made recommendations for hazards controls in accordance with the hierarchy of control. This is in keeping with CSA Z 1002 and good industry practice.

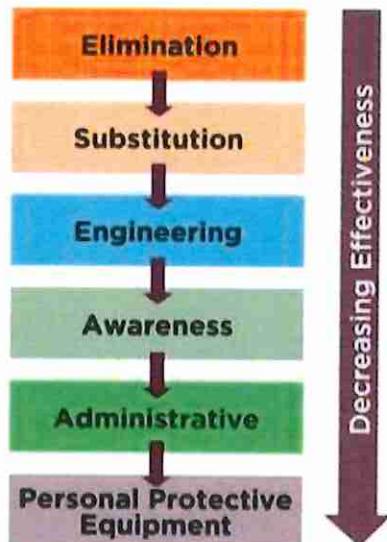
Detailed recommendations can be found within the HIRA file provided as a separate MS Excel format.

Appropriate protective measures should be immediately implemented on a graduated scale when the results of this preliminary risk analysis demonstrate that:

- (a) hazards or hazardous situations are well understood or the situation resulting in risk is obvious;
- (b) protective measures are known and it is certain that they will be effective and can be implemented; and
- (c) the protective measures do not unduly interfere with the intended purpose of the product, process, or service.

Where the above conditions do not exist, WSPS have recommended a more detailed risk analysis be conducted. Where further detailed risk analysis will be conducted, it is recommended that customers consider any interim hazard control measures and immediate steps to be taken in order to protect workers until a detailed risk analysis is complete and permanent risk controls are implemented.

Hierarchy of Control





ATTACHMENT #2

**Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT**
APPENDIX B - WSPS Preliminary Risk Analysis Model

The WSPS risk analysis model applies the following qualitative scales and principles:

$$\text{Risk (Rx)} = \text{Probability (Px)} : \text{Severity (Sx)}$$

where

$$\text{Probability (Px)} = \text{Frequency Hazard Exposure (Fx)} : \text{Likelihood of Loss Occurrence (Lx)}.$$

Preliminary Risk Analysis Steps

A final risk rating for each identified hazard is determined by completing the following steps:

Step	Action														
1 1a. <i>Estimation of Intrinsic Risk - Probability</i> <i>Step 1a. Estimate Frequency of Hazard Exposure (Fx)</i> . Using <i>Table 1</i> , determine the frequency of the hazard exposure during the performance of the work task(s) or job duty for the major occupation on a scale of F1 to F6 as defined below. 1b. <i>Step 1b. Estimate Likelihood of Loss Occurrence (Lx)</i> . Using <i>Table 1</i> , determine the chance of the potential loss event occurring, on a scale of L1 to L6 as defined below. NOTE: This estimate is based on history or the potential likelihood of the injury/illness loss event happening. Consideration to any hazard controls established by way advance planning and procurement for facility, process, system, or equipment design, construction or installation are included at this stage. This estimate should also consider how quickly the hazard can present itself and the physical and/or cognitive ability for the exposed worker to detect and avoid harm.															
	Table 1 – Values for Exposure Frequency (F) and Likelihood (L) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; background-color: #e0e0e0;">Frequency of Hazard Exposure</th><th style="text-align: center; background-color: #e0e0e0;">Likelihood of Loss Occurrence</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">F1. Continuous (hourly / more than 5 hours per week)</td><td style="text-align: center;">L1. Very Likely (has happened/ is expected)</td></tr> <tr> <td style="text-align: center;">F2. Frequent (daily / less than 5 hours per week)</td><td style="text-align: center;">L2. Likely (probable – it could happen)</td></tr> <tr> <td style="text-align: center;">F3. Occasional (weekly / less than 1 hr per week)</td><td style="text-align: center;">L3. Rare (seldom but possible)</td></tr> <tr> <td style="text-align: center;">F4. Unusual (once per month)</td><td style="text-align: center;">L4. Very Rare (very seldom but possible)</td></tr> <tr> <td style="text-align: center;">F5. Rare (few per year)</td><td style="text-align: center;">L5. Very Unlikely (slight possibility)</td></tr> <tr> <td style="text-align: center;">F6. Very Rare (yearly or less)</td><td style="text-align: center;">L6. Practically Impossible</td></tr> </tbody> </table>	Frequency of Hazard Exposure	Likelihood of Loss Occurrence	F1. Continuous (hourly / more than 5 hours per week)	L1. Very Likely (has happened/ is expected)	F2. Frequent (daily / less than 5 hours per week)	L2. Likely (probable – it could happen)	F3. Occasional (weekly / less than 1 hr per week)	L3. Rare (seldom but possible)	F4. Unusual (once per month)	L4. Very Rare (very seldom but possible)	F5. Rare (few per year)	L5. Very Unlikely (slight possibility)	F6. Very Rare (yearly or less)	L6. Practically Impossible
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	<i>Table 1 – Frequency (F) and Likelihood (L)</i>														

ATTACHMENT #2



Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

Step	Action																																																	
<p>1c.</p> <p>Step 1c. Table 2 below outlines how the WSPS risk analysis tool automatically calculates Probability values. Probability (Px) is represented on a scale of P1 to P5 where P1 represents the greatest probability of a loss event occurring.</p> <p>Table 2 – Probability (P)</p> <p>Probability (P) is a function of the values assigned in Step 1a and 1b. above, where;</p> $P(x) = F(x) : L(x)$	<p style="text-align: center;">Likelihood of Loss Occurrence</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Frequency of Hazard Exposure</th> <th style="width: 10%;">L1.</th> <th style="width: 10%;">L2.</th> <th style="width: 10%;">L3.</th> <th style="width: 10%;">L4.</th> <th style="width: 10%;">L5.</th> <th style="width: 10%;">L6.</th> </tr> </thead> <tbody> <tr> <td>F1.</td> <td>P1.</td> <td>P1.</td> <td>P2.</td> <td>P3.</td> <td>P3.</td> <td>P4.</td> </tr> <tr> <td>F2.</td> <td>P1.</td> <td>P2.</td> <td>P2.</td> <td>P3.</td> <td>P4.</td> <td>P4.</td> </tr> <tr> <td>F3.</td> <td>P2.</td> <td>P2.</td> <td>P3.</td> <td>P4.</td> <td>P4.</td> <td>P4.</td> </tr> <tr> <td>F4.</td> <td>P2.</td> <td>P3.</td> <td>P3.</td> <td>P4.</td> <td>P4.</td> <td>P5.</td> </tr> <tr> <td>F5.</td> <td>P3.</td> <td>P3.</td> <td>P4.</td> <td>P4.</td> <td>P5.</td> <td>P5.</td> </tr> <tr> <td>F6</td> <td>P3.</td> <td>P4.</td> <td>P4.</td> <td>P5.</td> <td>P5.</td> <td>P5.</td> </tr> </tbody> </table>	Frequency of Hazard Exposure	L1.	L2.	L3.	L4.	L5.	L6.	F1.	P1.	P1.	P2.	P3.	P3.	P4.	F2.	P1.	P2.	P2.	P3.	P4.	P4.	F3.	P2.	P2.	P3.	P4.	P4.	P4.	F4.	P2.	P3.	P3.	P4.	P4.	P5.	F5.	P3.	P3.	P4.	P4.	P5.	P5.	F6	P3.	P4.	P4.	P5.	P5.	P5.
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F2.	P1.	P2.	P2.	P3.	P4.	P4.																																												
F3.	P2.	P2.	P3.	P4.	P4.	P4.																																												
F4.	P2.	P3.	P3.	P4.	P4.	P5.																																												
F5.	P3.	P3.	P4.	P4.	P5.	P5.																																												
F6	P3.	P4.	P4.	P5.	P5.	P5.																																												
<p>2</p> <p>Estimation of <u>Intrinsic Risk – Severity</u></p> <p>Step 2 - Estimate Severity – using Table 3 estimate how severe the injury/illness would be if the loss event were to occur. This estimate considers the end result or maximum reasonable outcome based on industry experience, perceptions and standards on a scale of S1 to S5 as defined below.</p> <p>Estimation of severity should consider injury and illness from both short term (acute) and long term (chronic) perspectives.</p> <p>Table 3 – Values for Severity (S)</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 100%;">Severity Scale</th> </tr> </thead> <tbody> <tr> <td>S1. Fatality or permanent disability</td> </tr> <tr> <td>S2. Serious injury or illness (with Lost Time)</td> </tr> <tr> <td>S3. Moderate injury or illness (with extended medical treatment)</td> </tr> <tr> <td>S4. Minor injury or illness (with first aid or other immediate medical treatment)</td> </tr> <tr> <td>S5. Negligible / No injury</td> </tr> </tbody> </table>	Severity Scale	S1. Fatality or permanent disability	S2. Serious injury or illness (with Lost Time)	S3. Moderate injury or illness (with extended medical treatment)	S4. Minor injury or illness (with first aid or other immediate medical treatment)	S5. Negligible / No injury																																												
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ATTACHMENT #2

 Brockville Water Treatment Facility
 HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

Step	Action					
3	Estimated Intrinsic Risk Value Resultant Risk (Rx) is expressed on a scale of R1 to R25 as outlined in <i>Table 4</i> below. Risk categories are then established by numeric scale as defined below;					

Table 4 – Resultant Risk Scale and Categories

Severity	Probability					
		P1.	P2.	P3.	P4.	P5.
	S1.	R1	R2	R4	R7	R11
	S2.	R3	R5	R8	R12	R16
	S3.	R6	R9	R13	R17	R20
	S4.	R10	R14	R18	R21	R23
S5.	R15	R19	R22	R24	R25	

Risk (R) Categories

Very High / Extreme = R1 to R3	An imminently hazardous situation, where there are no hazard controls present or a failure in existing hazard controls. Such a situation may pose an immediate danger. Hazard elimination, immediate and/or interim hazard controls should be established without delay. Further detailed analysis and control planning may be required.
HIGH = R4 to R8	A serious or significant hazard -- a high priority for elimination, immediate and/or interim controls where further detailed analysis and control planning is required.
MEDIUM = R9 to R15	Moderate hazard – medium or next priority for controls and/or more detailed analysis as soon as possible
LOW = R16 to R25	Minor hazard -- lower priority for additional controls or hazard analysis while existing controls are maintained and monitored for success.



ATTACHMENT #2

Brockville Water Treatment Facility
HAZARD IDENTIFICATION AND RISK ANALYSIS REPORT

Step	Action
4	<p>Estimate Control Risk - Identification of existing workplace controls.</p> <p>Identify any existing hazard controls established at the workplace.</p> <p>For this estimate, focus on additional workplace hazard controls established at the workplace and in use versus controls established by way of procurement, installation or manufacture design.</p> <p>Consider additional workplace controls and Risk Failure Modes† related to</p> <ul style="list-style-type: none"> • Elimination by re design at workplace • Substitution • Engineering controls • Awareness - Systems that increase awareness • Administration - Organization and the application of a safe system of Work • Personal Protective Equipment (PPE) <p>† CSA Z1002 Annex C – C1 through C6</p> <p>NOTE: The employer remains the responsible party to determine acceptable levels of risk reduction are achieved, and that risk controls are continuously verified as remaining in place and validated as effective as part of their Hazard Management Program.</p>
5	<p>Re-evaluate to Estimate Control Risk</p> <p>Follow Steps 1 through 3 above to derive at a revised estimate Controlled Risk score. Consider how workplace controls have influenced a reduction in risk.</p> <p>Typically the score will vary by way of Step 1 – evaluation of Probability - as the frequency and/or likelihood factors may be reduced from the initial intrinsic risk evaluation score. Generally speaking, the Step 3 – Severity score will not show any significant reduction. NOTE: Where a control is said to be in place yet observation shows inconsistent or ad-hoc implementation, the estimated probability may not be effectively reduced. In extreme cases, the probability score, and therefore the overall Risk (R), can actually increase if the original (intrinsic) control has failed, been removed or is not maintained.</p>

END

ATTACHMENT #2



WORKPLACE SAFETY & PREVENTION SERVICES

As a business partner and expert in risk management, Workplace Safety & Prevention Services (WSPS) provides industry-specific health & safety solutions to help its customers achieve their goals and grow the life of their business.

Our solutions address economic realities and organizational risks, and help our 154,000 member firms achieve results that last: engaged employees, productivity improvements, reduced paper burden related to health and safety legislation and satisfied customers. The lasting results for our customers build a safer, more profitable Ontario.

wsps.ca

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WITH US



WSPS.CA

5110 Creekbank Road, Mississauga, ON L4W 0A1
1 877 494 WSPS (9777) | t 905 614 1400 | f 905 614 1414
[E customercare@wspsc.ca](mailto:customercare@wspsc.ca)

This product contains a minimum of 10% Post-Consumer Waste and is 100% recyclable.



Minutes
DWQMS Management/Infrastructure Review Meeting
Brockville Drinking Water System
December 7, 2017

Present: Dave Henderson, Mayor City of Brockville
 Tom Blanchard, Councilor City of Brockville
 Peter Raabe, Director of Environmental Services
 David Dick, Director Corporate Services
 Don Richards, Supervisor Water Systems (DWQMS Rep)

Regrets: Bob Casselman, City of Brockville Manager
 Jane Fullarton, Councilor City of Brockville

Location: City Hall Council Chambers

- Meeting commenced at 09:00hrs.
- D. Richards welcomed everyone to the meeting and provided a brief overview of the DWQMS meeting requirements.

Old Business:

- Action items from the last management meetings on June 1, 2017 reviewed, all items have been addressed

New Business:

- Overview of 2017 capital projects reviewed
 - Majority of 2017 capital projects completed with the exception of the low PLC installation currently underway and the Filter Backwash Wastewater Management project
 - Filter Backwash Wastewater Upgrades (Environment Canada Directive) – Preliminary design for wastewater transfer pumps and discharge piping revealed some challenges due to space restrictions with older facility, project will require additional funds of approximately 465K. Report will be prepared for FAO and Council
- 2018 Capital projects and 30 year capital plan reviewed
 - 2020 – 4.5M Twinning Feedermain (no redundancy)
 - 2023 – 1.3M Overhead Tank Re-coating (cathodic protection to extend life)
 - 2043 – 4.5M Overhead tank replacement (end of useful life)
- Environmental Assessment trunk feedermain twinning reviewed
 - Risk assessment, lack of redundancy, problem areas identified in 2013 condition assessment and past problems with feedermain identify the importance in

DWQMS Management/Infrastructure Review Meeting
December 7, 2017

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proceeding with the Environmental Assessment and the necessity to plan for the installation of a second feedermain

- Backflow Prevention By-Law Implementation reviewed
 - Conduct backflow surveys of City owned facilities WT, WWT, Arenas
 - Address all deficiencies identified in backflow survey results
 - Identification of Serve risk facilities in City
 - Develop system to manage database for tracking facility surveys and annual backflow device inspection records
 - Update City's website to better inform business and property owners of new By-Law requirements
 - Slowly introduce backflow By-law requirements to high risk facilities
 - May require additional resources for implementation and enforcement of By-Law
 - Projected implementation, 2-3 years
- Succession Planning Challenges
 - Cross training time allocation (50% Distribution 50% Treatment) 8 years to become fully Certified in both WT & WD Class III
 - Aging workforce, 60% of operations staff over the age of 50
 - Physically demanding job
 - Retirements 40% of workforce is eligible within the next 4 years
 - Chris Hall - confirmed retirement (Jan 5, 2018)
 - Dwayne Mallory - eligible (Oct 2017)
 - Doug Jensen - eligible (Dec 2019)
 - Don Richards - eligible (Oct 2021)
 - Inadequate time to properly mentor and train new staff
 - Increase risk and stress on managers and junior staff operating systems during adverse conditions
- Succession Planning Progression
 - Graduate Technicians - Endeavored to utilize Environmental Technician graduates as seasonal temps - restrictions to hire graduates due to union contract
 - Staffing levels - Consideration was given to increase number of operators to properly train and prepare for upcoming retirements. Restrictions to increase staffing levels due to budget limitations
 - Internal restructuring - consideration was given for internal restructuring, promote seasoned operator to Assistant Chief Operator "sub foreman" to assist the Chief Operator with construction site supervision, ORO on-call responsibilities, mentoring and training junior operators. Current union contract restricts promotion due to wage un-equivalency
 - External operator recruitment - consideration was given to recruit fully certified Class III operator to fill retirement vacancy. Existing union agreement external to Water Systems Division restricted recruitment of experienced fully certified operator

D W Q M S Management/Infrastructure Review Meeting
December 7, 2017

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- Succession Planning Considerations
 - Temporary Positions
 - Seasonal temp positions promote within City
 - Communications with HR, union and all staff on promoting within City
 - Public works operators or any other City staff interested in temp transfer would be required to:
 - Write OIT at their own expense
 - Transfer from March to September and return to old position
 - Be willing to transfer at a reduced wage rate (OIT) until higher certification level is achieved
 - Graduate Technicians
 - Work with Colleges recruiting Environmental technicians with OIT certification and one week mandatory training completed
 - Increase staffing in division with OIT operators, hire 2-3 years prior to operator retirements to gain necessary experience in system
 - Increase operational budgets to fund additional wages for new operational staff
 - Certified Operator Recruitment
 - Hire fully certified operators from other Municipalities
 - Increase staffing in division with fully certified operators, hire 1-2 years prior to operator retirements to gain necessary experience
 - Increase budget to fund additional staff
 - Assistant Chief Operator
 - Fill position of Assistant Chief Operator
 - Share ORO on-call responsibilities
 - Mentor and train junior staff
 - Provide assistance with construction site supervision - WSPS Hazard Identification & Risk Analysis Report Nov 2017
 - Financial Considerations
 - Increase operational budget to support succession planning
- Meeting adjourned at 11:00 hrs.

Prepared by: D. Richards, Water Systems Supervisor

NOTICE: Should there be any significant errors, inaccuracies or omissions please notify the author in writing and this will be passed along to all other meeting attendees.



**Drinking Water Quality Management System
Brockville Water Systems Division – Operational Plan**

FORM TITLE: DWQMS Management Review Meeting Action Item Template		FORM NO.: 016
ISSUED BY: D. Richards		
AUTHORIZED BY: D. Richards SIGNATURE:	REV. DATE: REVISED BY:	ISSUE DATE: 2013-05-23

Meeting Date: DEC 7, 2017

Operational Plan: City of Brockville

Attendees: Dave Henderson, Peter Raabe, David Dick, Don Richards, Tom Blanchard

Regrets: Bob Casselman, Jane Fullarton

#	ACTION ITEM	RESPONSIBLE INDIVIDUAL	DUE DATE	COMPLETION DATE	Comments
1	Federal Directive – Filter Backwash Wastewater Management	D. Richards P. Raabe	February 1, 2018		<p>Prepare report requesting additional funding to complete Filter Backwash Wastewater upgrades – Approximate funding request 465K</p> <p>Available Reserves</p> <ul style="list-style-type: none"> • Working Capital Operations Reserve (363K) • Long Term Capital Asset Reserve (2.1M)
2	Federal Directive - Environment Canada	D. Richards	January 30, 2018		Provide update to Environment Canada on Filter Backwash Wastewater upgrade progression



Drinking Water Quality Management System
Brockville Water Systems Division – Operational Plan

FORM TITLE: DWQMS Management Review Meeting Action Item Template			FORM NO.: 016	
			ISSUED BY: D. Richards	
AUTHORIZED BY: D. Richards SIGNATURE:		REV. DATE: REVISED BY:		ISSUE DATE: 2013-05-23
3	Succession Planning	D. Richards K. Vandewal P. Raabe B. Casselman	March 31, 2018	Move forward with succession plan recommendations
4	Master Water Plan Update, providing future water/wastewater services to region and including large capital projects i.e. treatment operations, feedermains and water tower	B. Casselman	On-Going	Bring forward a recommendation to Council to have Master Water Plan updated



ATTACHMENT # 3

Drinking Water Quality Management System Brockville Water Systems Division – Operational Plan

PROCEDURE TITLE: DWQMS Management Review Meeting Attendance Form	FORM NO.: 017 ISSUED BY: D. Richards
AUTHORIZED BY: D. Richards SIGNATURE:	REV. DATE: REVISED BY: D. Richards

Meeting Location: City Hall Boardroom

Date: December 7, 2017

ATTACHMENT #4

**Ministry of the Environment
and Climate Change**

Safe Drinking Water
Branch

Kingston District Office
1259 Gardiners Road, Unit 3
PO Box 22032
Kingston ON K7M 8S5

**Ministère de l'Environnement et
de l'Action en matière de
changement climatique**

Direction du contrôle de la qualité de
l'eau potable

Bureau du district de Kingston
1259, route Gardiners, unité 3
C. P. 22032
Kingston (Ontario) K7M 8S5



October 19, 2017

Email: bcasselmann@brockville.com

The City of Brockville
P.O. Box 5000
1 King Street West
Brockville, Ontario
K6V 7A5

Attention: Mr. Bob Casselman, City Manager

Dear Mr. Casselman:

Re: Brockville Drinking Water System 2017-2018 Inspection Report

The enclosed report documents findings of the inspection that was performed at the Brockville drinking water system on June 27, 2017.

Two sections of the report, namely "Actions Required" and "Recommended Actions" cite due dates for the submission of information or plans to my attention.

Please note that "Actions Required" are linked to incidents of non-compliance with regulatory requirements contained within an Act, a Regulation, or site-specific approvals, licenses, permits, orders, or instructions. Such violations could result in the issuance of mandatory abatement instruments including orders, tickets, penalties, or referrals to the ministry's Investigations and Enforcement Branch. ***There are no "Actions Required" linked to non-compliance with regulatory requirements coming out of this report.***

"Recommended Actions" convey information that the owner or operating authority should consider implementing in order to advance efforts already in place to address such issues as emergency preparedness, the fulsome availability of information to consumers, and conformance with existing and

Table 4: UV Disinfection Equipment			
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Minimum Continuous Pass-Through UV Dose (mJ/cm²)	Column 3 Control Strategy	Column 4 Test Parameter*
Brockville Water Treatment Plant	20	UVT and UV Intensity Set Point	Flow Rate
			UV Intensity
			UV Transmittance**
			UV Lamp Status

(*) parameters to be monitored when UV system is in operation

(**) UVT to be monitored and recorded once daily using a portable device

2.0 Flow Measurement and Recording Requirements

- 2.1** For each treatment subsystem identified in column 1 of Table 1 and in addition to any other flow measurement and recording that may be required, continuous flow measurement and recording shall be undertaken for:
 - 2.1.1** The flow rate and daily volume of treated water that flows from the treatment subsystem to the distribution system.
 - 2.1.2** The flow rate and daily volume of water that flows into the treatment subsystem.
- 2.2** For each treatment subsystem component identified in column 2 of Table 2 and in addition to any other flow measurement and recording that may be required, continuous flow measurement and recording shall be undertaken for the flow rate and daily volume of water that flows into the treatment subsystem component.
- 2.3** Where a rated capacity from Table 1 or a maximum flow rate from Table 2 is exceeded, the following shall be recorded:
 - 2.3.1** The difference between the measured amount and the applicable rated capacity or maximum flow rate specified in Table 1 or Table 2;
 - 2.3.2** The time and date of the measurement;
 - 2.3.3** The reason for the exceedance; and
 - 2.3.4** The duration of time that lapses between the applicable rated capacity or maximum flow rate first being exceeded and the next measurement where the applicable rated capacity or maximum flow rate is no longer exceeded.

3.0 Calibration of Flow Measuring Devices

- 3.1** All flow measuring devices that are required by regulation, by a condition in the Drinking Water Works Permit, or by a condition otherwise imposed by the Ministry of the Environment and Climate Change, shall be checked and calibrated in accordance with the manufacturer's instructions.

- 3.2** If the manufacturer's instructions do not indicate how often to check and calibrate a flow measuring device, the equipment shall be checked and calibrated at least once every 12 months during which the drinking water system is in operation.
- 3.2.1 For greater certainty, if condition 3.2 applies, the equipment shall be checked and calibrated not more than 30 days after the first anniversary of the day the equipment was checked and calibrated in the previous 12-month period.

4.0 Additional Sampling, Testing and Monitoring

Drinking Water Health and Non-Health Related Parameters

- 4.1** For each treatment subsystem or treatment subsystem component identified in column 1 of Tables 5 and 6 and in addition to any other sampling, testing and monitoring that may be required, sampling, testing and monitoring shall be undertaken for a test parameter listed in column 2 at the sampling frequency listed in column 3 and at the monitoring location listed in column 4 of the same row.

Table 5: Drinking Water Health Related Parameters			
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Sampling Frequency	Column 4 Monitoring Location
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Table 6: Drinking Water Non-Health Related Parameters			
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Sampling Frequency	Column 4 Monitoring Location
Not Applicable	Not Applicable	Not Applicable	Not Applicable

Environmental Discharge Parameters

- 4.2** For each treatment subsystem or treatment subsystem component identified in column 1 of Table 7 and in addition to any other sampling, testing and monitoring that may be required, sampling, testing and monitoring shall be undertaken for a test parameter listed in column 2 using the sample type identified in column 3 at the sampling frequency listed in column 4 and at the monitoring location listed in column 5 of the same row.
- 4.3** For the purposes of Table 7:
- 4.3.1 Manual Composite means the mean of at least three grab samples taken during a discharge event, with one sample being taken immediately following the commencement of the discharge event, one sample being taken approximately at the mid-point of the discharge event and one sample being taken immediately before the end of the discharge event; and

152-101

Schedule C

June 27th, 2016

- 4.3.2 Automated Composite means samples must be taken during a discharge event by an automated sampler at a minimum sampling frequency of once per hour.
- 4.4** Any sampling, testing and monitoring for the test parameter Total Suspended Solids shall be performed in accordance with the requirements set out in the publication "Standard Methods for the Examination of Water and Wastewater", 21st Edition, 2005, or as amended from time to time by more recently published editions.

Table 7: Environmental Discharge Parameters				
Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Sample Type	Column 4 Sampling Frequency	Column 5 Monitoring Location
Brockville Water Treatment Plant	Total Suspended Solids	Manual Composite	Monthly	Point of discharge

- 4.5** Pursuant to Condition 10 of Schedule B of this licence, the owner may undertake the following environmental discharges associated with the maintenance and/or repair of the drinking water system:
- 4.5.1 The discharge of potable water from a watermain to a road or storm sewer;
 - 4.5.2 The discharge of potable water from a water storage facility or pumping station:
 - 4.5.2.1 To a road or storm sewer; or
 - 4.5.2.2 To a watercourse where the discharge has been dechlorinated and if necessary, sediment and erosion control measures have been implemented.
 - 4.5.3 The discharge of dechlorinated non-potable water from a watermain, water storage facility or pumping station to a road or storm sewer;
 - 4.5.4 The discharge of raw water from a groundwater well to the environment where if necessary, sediment and erosion control measures have been implemented; and
 - 4.5.5 The discharge of raw water, potable water or non-potable water from a treatment subsystem to the environment where if necessary, the discharge has been dechlorinated and sediment and erosion control measures have been implemented.

5.0 Studies Required

- 5.1** Not applicable.

6.0 Source Protection

- 6.1** Not applicable.

Schedule D: Conditions for Relief from Regulatory Requirements

System Owner	The Corporation of the City of Brockville
Licence Number	152-101
Drinking Water System Name	Brockville Drinking Water System
Schedule D Issue Date	June 27th, 2016

1.0 Lead Regulatory Relief

- 1.1 Any relief from regulatory requirements previously authorized by the Director in respect of the drinking water system under section 38 of the SDWA in relation to the sampling, testing or monitoring requirements contained in Schedule 15.1 of O. Reg. 170/03 shall remain in force until such time as Schedule 15.1 of O. Reg. 170/03 is amended after June 1, 2009.
- 1.2 In addition to condition 1.1, for a drinking water system or drinking water subsystem identified by columns 1 and 2 of Table 1 and notwithstanding the provisions of Schedule 15.1 of O. Reg. 170/03, the owner is not required to comply with the sampling requirements of columns 3, 4 and 5 of the same row.

Table 1: Number of Sampling Points Required for Compliance with Schedule 15.1 of O. Reg. 170/03

Column 1 Drinking Water System or Drinking Water Subsystem Name	Column 2 DWS Number	Column 3 Number of Sampling Points in Plumbing that Serves Private Residences	Column 4 Number of Sampling Points in Plumbing that Does Not Serve Private Residences	Column 5 Number of Sampling Points in Distribution System
Brockville Drinking Water System	220001263	60	6	12

152-101

Schedule D

June 27th, 2016

- 1.3** For a drinking water system or drinking water subsystem identified by columns 1 and 2 of Table 2 and in exchange for any relief from regulatory requirements granted in condition 1.2 and subject to any other applicable conditions of this licence and drinking water works permit, the owner is required to comply with the sampling requirements of columns 3, 4 and 5 of the same row.

Table 2: Number of Sampling Points Required for Relief from Regulatory Requirements				
Column 1 Drinking Water System or Drinking Water Subsystem Name	Column 2 DWS Number	Column 3 Number of Sampling Points in Plumbing that Serves Private Residences	Column 4 Number of Sampling Points in Plumbing that Does Not Serve Private Residences	Column 5 Number of Sampling Points in Distribution System
Brockville Drinking Water System	220001263	0	0	4

- 1.4** For a drinking water system or drinking water subsystem identified by columns 1 and 2 of Table 3, the relief from regulatory requirements granted in condition 1.2 is in effect for the sampling period identified in column 3 of the same row.

Table 3: Sampling Periods		
Column 1 Drinking Water System or Drinking Water Subsystem Name	Column 2 DWS Number	Column 3 Sampling Period
Brookville Drinking Water System	220001263	June 15, 2016 to October 15, 2016

- 1.5** The owner of the drinking water system and the operating authority for the system shall ensure that samples are taken as described in condition 1.3 to test for total alkalinity and pH during each of the sampling periods identified in column 3 of Tables 3.

2.0 Other Regulatory Relief

- 2.1** Not applicable.

Schedule E: Pathogen Log Removal/Inactivation Credits

System Owner	The Corporation of the City of Brockville
Licence Number	152-101
Drinking Water System Name	Brockville Drinking Water System
Schedule E Issue Date	June 27th, 2016

1.0 Primary Disinfection Pathogen Log Removal/Inactivation Credits

Brockville Water Supply Plant

St. Lawrence River [SURFACE WATER]

Minimum Log Removal/ Inactivation Required	Cryptosporidium Oocysts	Giardia Cysts ^a	Viruses ^b
Brockville Water Supply Plant	2	3	4

- ^a At least 0.5 log inactivation of Giardia shall be achieved by the disinfection portion of the overall water treatment process.
- ^b At least 2 log inactivation of viruses shall be achieved by disinfection.

Log Removal/Inactivation Credits Assigned ^c	Cryptosporidium Oocysts	Giardia Cysts	Viruses
Direct Filtration	2	2	1
UV Disinfection [20 mJ/cm ²]	2	3	2
Chlorination [CT: Chlorine Contact Clearwell]	-	0.6	2+

- ^c Log removal/inactivation credit assignment is based on each treatment process being fully operational and the applicable log removal/inactivation credit assignment criteria being met.

152-101

Schedule E

June 27th, 2016

Treatment Component	Log Removal/Inactivation Credit Assignment Criteria
Direct Filtration	<ol style="list-style-type: none"> 1. A chemical coagulant shall be used at all times when the treatment plant is in operation; 2. Chemical dosages shall be monitored and adjusted in response to variations in raw water quality; 3. Effective backwash procedures shall be maintained including filter-to-waste or an equivalent procedure during filter ripening to ensure that effluent turbidity requirements are met at all times; 4. Filtrate turbidity shall be continuously monitored from each filter; and 5. Performance criterion for filtered water turbidity of less than or equal to 0.3 NTU in 95% of the measurements each month shall be met for each filter.
UV Disinfection	<p>Duty UV Sensor Checks and Calibration</p> <ol style="list-style-type: none"> 1. Duty UV sensors shall be checked on at least a monthly basis against a reference UV sensor or at a frequency as otherwise recommended by the UV equipment manufacturer ; 2. When comparing a duty UV sensor to a reference UV sensor, the calibration ratio (intensity measured with the duty UV sensor/intensity measured with the reference UV sensor) shall be less than or equal to 1.2; 3. If the calibration ratio is greater than 1.2, the duty UV sensor shall be replaced with a calibrated UV sensor or a UV sensor correction factor shall be applied while the problem with the UV sensor is being resolved; 4. Reference UV sensors shall be checked against a Master Reference Assembly at a minimum frequency of once every three years or on a more frequent basis depending upon the recommendations of the equipment manufacturer; <p>Operational Requirements</p> <ol style="list-style-type: none"> 5. Ultraviolet light disinfection equipment shall have a feature that ensures that no water is directed to users of water treated by the equipment or that causes an alarm to sound in the event that the equipment malfunctions, loses power or ceases to provide the appropriate level of disinfection; 6. Water shall not flow through a UV reactor when the reactor's UV lights are off or not fully energized; 7. UV lamp status shall indicate whether each UV lamp is on or off; 8. All UV sensors shall operate within their calibration range or corrective measures shall be taken; and 9. Installed or replaced UV equipment components shall be equal or better than the components used during validation testing unless the UV equipment was revalidated.
Chlorination	<ol style="list-style-type: none"> 1. Sampling and testing for free chlorine residual shall be carried out by continuous monitoring equipment in the treatment process at or near a location where the intended contact time has just been completed in accordance with the Ministry's Procedure for Disinfection of Drinking Water in Ontario; and 2. At all times, CT provided shall be greater than or equal to the CT required to achieve the log removal credits assigned.
Primary Disinfection Notes	



DRINKING WATER WORKS PERMIT

Permit Number: 152-201
Issue Number: 2

Pursuant to the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, this drinking water works permit is issued under Part V of the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32 to:

The Corporation of the City of Brockville

**1 King St. W.
P.O. Box 5000, Brockville ON K6V 7A5**

For the following municipal residential drinking water system:

Brockville Drinking Water System

This drinking water works permit includes the following:

Schedule	Description
Schedule A	Drinking Water System Description
Schedule B	General
Schedule C	All documents issued as Schedule C to this drinking water works permit which authorize alterations to the drinking water system
Schedule D	Process Flow Diagrams

DATED at TORONTO this 27th day of June, 2016

Signature

Aziz Ahmed, P.Eng.
 Director
 Part V, *Safe Drinking Water Act, 2002*

Schedule A: Drinking Water System Description

System Owner	The Corporation of the City of Brockville
Permit Number	152-201
Drinking Water System Name	Brockville Drinking Water System
Schedule A Issue Date	June 27th, 2016

1.0 System Description

- 1.1 The following is a summary description of the works comprising the above drinking water system:

Overview

The **Brockville Drinking Water System** consists of one (1) drinking water treatment plant, one (1) storage reservoir/pumping station, one (1) elevated storage tank and approximately 130 kilometers of distribution watermains.

Brockville Water Supply Plant

Drinking Water Supply Plant

- Brockville Water Treatment Plant

Pumping Station

- First Avenue Pumping Station
- Sunset Boulevard Pumping Station

Storage Reservoir

- Parkedale Avenue Reservoir/Pumping Station/Rechlorination Facility

Elevated Storage

- Perth Street Elevated Tank

Brockville Distribution

152-201

Schedule A

June 27th, 2016

Brockville Water Supply Plant**Location and System Type**

Street Address	20 Rivers Avenue, Brockville
UTM Coordinates	NAD 27, Zone 18, 444500.00 E, 4936150.00 N
System Type	Surface water supply and treatment
Notes	

Surface Water Supply**Intake Facility**

Description	Raw water intake system extending into St. Lawrence River
Equipment	900 mm diameter intake pipe and intake crib fitted with chlorine diffusers for zebra mussel control, located approximately 294 m offshore and connected to the wet well at low lift pumping station
Notes	

Low Lift Works**Low Lift Pumping Station**

Description	Low lift pumping station for delivering raw water
Equipment	Screen chamber Wet well equipped with three (3) raw water pumps: - One (1) pump at 18,200 m ³ /day at 23.2 m TDH; - One (1) pump at 18,200 m ³ /day at 23.2 m TDH equipped with dual electric/diesel engine drive; - One (1) pump at 22,700 m ³ /day at 23.2 m TDH
Discharge to	Water treatment plant
Notes	

Meter Chamber

Description	An underground chamber for metering, coagulant dosage, chlorine injection and hydraulic mixing
Discharge to	Flocculation tanks
Notes	

152-201

Schedule A

June 27th, 2016

Flocculation/Filtration**Flocculation**

Description	Three (3) two-cells spiral up-flow flocculation tanks (in series) equipped with baffles and a common overflow collection channel
Dimensions	Each cell 4.0 m x 4.0 m x 6.0 m deep
Notes	

Filtration

Description	Two (2) dual media filter units (in parallel) each with 600 mm layer of granular activated carbon and 300 mm layer of silica sand, complete with underdrains and a backwash system
Dimensions	Each filter 8.25 m x 5.5 m with capacity of 19,600 m ³ /day
Equipment	Two (2) backwash pumps (duty and standby) each rated 45,000 m ³ /day
Notes	

Ultraviolet (UV) Disinfection System**UV Disinfection Units**

Description	UV system for disinfection
Equipment	Two (2) UV reactors (duty and standby) each at 36,400 m ³ /day
Notes	Used as a backup for disinfection with chlorination. The system to provide a minimum 20 mJ/cm ² at design flow rate installed with UV intensity sensor, automatic cleaning system, alarms and controls

Chemical Addition**Coagulant**

Description	Coagulation feed system
Feed Points	Metering chamber Waste residual settling tank
Equipment	Two (2) metering pumps (duty and standby) each capable of 80 L/hr. One (1) metering pump capable of 7 L/hr. One (1) bulk storage tank and two (2) day tanks with spill containment
Notes	

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Schedule A

June 27th, 2016

Chlorine

Description	Gaseous chlorine addition for disinfection
Feed Points	Intake crib (zebra mussel control)
	Metering chamber
	Clearwell
	Suction side of high lift pump
Equipment	Two (2) chlorine gas dosage units each with one (1) vacuum regulator and up to six (6) chlorine gas cylinders
Notes	

Fluoride

Description	Hydrofluosilic acid solution for fluoridation
Feed Points	Suction side of high lift pump
Equipment	One (1) metering pump capable of 20 L/hr. with chemical storage drums
Notes	

Waste Residual Management System**Backwash Water Holding Tank**

Description	One (1) backwash wastewater holding tank
Dimensions	400 m ³
Equipment	Two (2) transfer pumps discharge to settling tank
Notes	

Backwash Water Settling Tank

Description	One (1) backwash wastewater settling tank
Dimensions	84 m ³
Equipment	One (1) sludge transfer pump discharge to sanitary system
Notes	Supernatant overflow to St. Lawrence River

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Schedule A

June 27th, 2016

On-Site Storage**Chlorine Contact Clearwells**

Description	One (1) chlorine contact clearwell complete with overflow structure
Dimensions	300 m ³
Discharge to	Reservoir
Notes	

Reservoirs

Description	One (1) in-ground reservoir complete with inlet baffle walls
Dimensions	3,500 m ³
Discharge to	High lift pumping station
Notes	

High Lift Works**High Lift Pumping Station**

Description	A high lift pumping station equipped with five (5) high lift pump
Equipment	One (1) high lift pump at 6,800 m ³ /day at 54.9 m TDH
	One (1) high lift pump at 11,350 m ³ /day at 54.9 m TDH
	One (1) high lift pump at 15,900 m ³ /day at 54.9 m TDH
	Two (2) diesel driven high lift pumps, each at 18,200 m ³ /day at 70 m
Discharge to	Distribution system
Notes	

Instrumentation and Control**SCADA System**

Description	Process control and monitoring equipment
Notes	System control with data acquisition including various on-line analyzers and monitors

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Schedule A

June 27th, 2016

Emergency Power**Backup Power Supply**

Description	One (1) standby diesel generator rated 100 kW
Notes	

Brockville Water Distribution System**Pumping Stations****First Avenue Pumping Station**

Location	First Avenue, Brockville
UTM Coordinates	NAD 83, UTM Zone 18: 446631 m E., 4938852 m N
Description	Pumping station for distribution system
Equipment	Two (2) centrifugal pumps each at 56.8 L/s at 27.4 m TDH
Notes	

Sunset Boulevard Pumping Station

Location	Sunset Boulevard, Brockville
UTM Coordinates	NAD 83, UTM Zone 18: 446219 m E., 4939774 m N
Description	Pumping station for distribution system
Equipment	Two (2) centrifugal pumps each at 22.7 L/s at 10.1 m TDH
Notes	

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Schedule A

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Storage Reservoirs**Parkdale Avenue Reservoir/Pumping Station/Rechlorination Facility**

Location	Parkdale Avenue, Brockville
UTM Coordinates	NAD 83, UTM Zone 18: 445055 m E., 4939922 m N
Description	An at-grade storage tank with one (1) submersible mixing unit, pumping station and rechlorination facility
Dimensions	Total volume 7,600 m ³
Equipment	<p>One (1) constant speed centrifugal pump at 8,200 m³/d at 45.7 m TDH (for pressure zone 1)</p> <p>One (1) constant speed centrifugal pump at 16,000 m³/d at 45.7 m TDH (for pressure zone 1)</p> <p>One (1) variable speed diesel driven centrifugal pump at 22,700 m³/d at 45.7 m TDH (for pressure zone 1)</p> <p>One (1) variable speed centrifugal pump at 8,200 m³/d at 22.5 m TDH (for pressure zone 2)</p> <p>One (1) constant speed centrifugal pump at 14,300 m³/d at 22.5 m TDH (pressure zone 2)</p> <p>One (1) constant speed diesel driven centrifugal pump at 22,700 m³/d at 22.5 m TDH (pressure zone 2)</p> <p>One (1) constant speed centrifugal pump at 3,300 m³/d at 28 m TDH (pressure zone 2)</p> <p>One (1) sodium hypochlorite metering pump capable of 20 L/hr. and one (1) chemical day tank (for pressure zone 1) – used as required</p> <p>One (1) standby diesel generator rated 200 kW with fuel supply system</p>
Notes	

Elevated Storage Tanks**Perth Street Elevated Storage Tank**

Location	Perth Street, Brockville
UTM Coordinates	NAD 83, UTM Zone 18: 444762 m E., 4938111 m N
Description	Elevated storage tank
Dimensions	Total volume 1,900 m ³
Notes	

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Schedule A

June 27th, 2016

Watermains

- 1.2 Watermains within the distribution system comprise:

- 1.2.1 Watermains that have been set out in each document or file identified in column 1 of Table 1.

Table 1: Watermains

Column 1 Document or File Name	Column 2 Date
MASTER WATERMAIN PLATES all 60 plates.pdf	21 November 2014

- 1.2.2 Watermains that have been added, modified, replaced or extended further to the provisions of Schedule C of this drinking water works permit on or after the date identified in column 2 of Table 1 for each document or file identified in column 1.

- 1.2.3 Watermains that have been added, modified, replaced or extended further to an authorization by the Director on or after the date identified in column 2 of Table 1 for each document or file identified in column 1.

Schedule B: General

System Owner	The Corporation of the City of Brockville
Permit Number	152-201
Drinking Water System Name	Brockville Drinking Water System
Schedule B Issue Date	June 27th, 2016

1.0 **Applicability**

- 1.1 In addition to any other requirements, the drinking water system identified above shall be altered and operated in accordance with the conditions of this drinking water works permit and the licence.
- 1.2 The definitions and conditions of the licence shall also apply to this drinking water works permit.

2.0 **Alterations to the Drinking Water System**

- 2.1 Any document issued by the Director as a Schedule C to this drinking water works permit shall provide authority to alter the drinking water system in accordance, where applicable, with the conditions of this drinking water works permit and the licence.
- 2.2 All Schedule C documents issued by the Director for the drinking water system shall form part of this drinking water works permit.
- 2.3 All parts of the drinking water system in contact with drinking water which are:
 - 2.3.1 Added, modified, replaced, extended; or
 - 2.3.2 Taken out of service for inspection, repair or other activities that may lead to contamination,
 shall be disinfected before being put into service in accordance with a procedure approved by the Director or in accordance with the applicable provisions of the following documents:
 - a) The ministry's Watermain Disinfection Procedure, effective no later than December 27th, 2016;
 - b) AWWA C652 – Standard for Disinfection of Water-Storage Facilities;
 - c) AWWA C653 – Standard for Disinfection of Water Treatment Plants; and
 - d) AWWA C654 – Standard for Disinfection of Wells.
- 2.4 The owner shall notify the Director within thirty (30) days of the placing into service or the completion of any addition, modification, replacement or extension of the drinking water system which had been authorized through:

- 2.4.1 Schedule B to this drinking water works permit which would require an alteration of the description of a drinking water system component described in Schedule A of this drinking water works permit;
 - 2.4.2 Any Schedule C to this drinking water works permit respecting works other than watermains; or
 - 2.4.3 Any approval issued prior to the issue date of the first drinking water works permit respecting works other than watermains which were not in service at the time of the issuance of the first drinking water works permit.
- 2.5** For greater certainty, the notification requirements set out in condition 2.4 do not apply to any addition, modification, replacement or extension in respect of the drinking water system which:
- 2.5.1 Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03;
 - 2.5.2 Constitutes maintenance or repair of the drinking water system; or
 - 2.5.3 Is a watermain authorized by condition 3.1 of Schedule B of this drinking water works permit.
- 2.6** The owner shall notify the legal owner of any part of the drinking water system that is prescribed as a municipal drinking water system by section 2 of O. Reg. 172/03 of the requirements of the licence and this drinking water works permit as applicable to the prescribed system.
- 2.7** For greater certainty, any alteration to the drinking water system made in accordance with this drinking water works permit may only be carried out after other legal obligations have been complied with including those arising from the *Environmental Assessment Act*, *Niagara Escarpment Planning and Development Act*, *Oak Ridges Moraine Conservation Act, 2001* and *Greenbelt Act, 2005*.

3.0 Watermain Additions, Modifications, Replacements and Extensions

- 3.1** The drinking water system may be altered by adding, modifying, replacing or extending a watermain within the distribution system subject to the following conditions:
- 3.1.1 The design of the watermain addition, modification, replacement or extension:
 - a) Has been prepared by a Professional Engineer;
 - b) Has been designed only to transmit water and has not been designed to treat water;
 - c) Satisfies the design criteria set out in the Ministry of the Environment and Climate Change publication "Watermain Design Criteria for Future Alterations Authorized under a Drinking Water Works Permit – June 2012", as amended from time to time; and
 - d) Is consistent with or otherwise addresses the design objectives contained within the Ministry of the Environment and Climate Change publication

"Design Guidelines for Drinking Water Systems, 2008", as amended from time to time.

- 3.1.2 The maximum demand for water exerted by consumers who are serviced by the addition, modification, replacement or extension of the watermain will not result in an exceedance of the rated capacity of a treatment subsystem or the maximum flow rate for a treatment subsystem component as specified in the licence, or the creation of adverse conditions within the drinking water system.
- 3.1.3 The watermain addition, modification, replacement or extension will not adversely affect the distribution system's ability to maintain a minimum pressure of 140 kPa at ground level at all points in the distribution system under maximum day demand plus fire flow conditions.
- 3.1.4 Secondary disinfection will be provided to water within the added, modified, replaced or extended watermain to meet the requirements of O. Reg. 170/03.
- 3.1.5 The watermain addition, modification, replacement or extension is wholly located within the municipal boundary over which the owner has jurisdiction.
- 3.1.6 The owner of the drinking water system consents in writing to the watermain addition, modification, replacement or extension.
- 3.1.7 A Professional Engineer has verified in writing that the watermain addition, modification, replacement or extension meets the requirements of condition 3.1.1.
- 3.1.8 The owner of the drinking water system has verified in writing that the watermain addition, modification, replacement or extension meets the requirements of conditions 3.1.2 to 3.1.6.
- 3.2 The authorization for the addition, modification, replacement or extension of a watermain provided for in condition 3.1 does not include the addition, modification, replacement or extension of a watermain that:
 - 3.2.1 Passes under or through a body of surface water, unless trenchless construction methods are used;
 - 3.2.2 Has a nominal diameter greater than 900 mm;
 - 3.2.3 Results in the fragmentation of the drinking water system; or
 - 3.2.4 Connects to another drinking water system, unless:
 - a) Prior to construction, the owner of the drinking water system seeking the connection obtains written consent from the owner or owner's delegate of the drinking water system being connected to; and
 - b) The owner of the drinking water system seeking the connection retains a copy of the written consent from the owner or owner's delegate of the drinking water system being connected to as part of the record that is recorded and retained under condition 3.3.

- 3.3** The verifications required in conditions 3.1.7 and 3.1.8 shall be:
- 3.3.1** Recorded on "Form 1 – Record of Watermains Authorized as a Future Alteration", as published by the Ministry of the Environment and Climate Change, prior to the watermain addition, modification, replacement or extension being placed into service; and
 - 3.3.2** Retained for a period of ten (10) years by the owner.
- 3.4** For greater certainty, the verification requirements set out in condition 3.3 do not apply to any addition, modification, replacement or extension in respect of the drinking water system which:
- 3.4.1** Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03; or
 - 3.4.2** Constitutes maintenance or repair of the drinking water system.
- 3.5** The document or file referenced in Column 1 of Table 1 of Schedule A of this drinking water works permit that sets out watermains shall be retained by the owner and shall be updated to include watermain additions, modifications, replacements and extensions within 12 months of the addition, modification, replacement or extension.
- 3.6** The updates required by condition 3.5 shall include watermain location relative to named streets or easements and watermain diameter.

4.0 Minor Modifications to the Drinking Water System

- 4.1** The drinking water system may be altered by adding, modifying or replacing the following components in the drinking water system:
- 4.1.1** Raw water pumps and treatment process pumps in the treatment system;
 - 4.1.2** Coagulant feed systems in the treatment system, including the location and number of dosing points;
 - 4.1.3** Valves;
 - 4.1.4** Instrumentation and controls, including SCADA systems, and software associated with these devices;
 - 4.1.5** Filter media, backwashing equipment and under-drains in the treatment system; or,
 - 4.1.6** Spill containment works.
- 4.2** The drinking water system may be altered by adding, modifying, replacing or removing the following components in the drinking water system:
- 4.2.1** Treated water pumps and associated equipment;
 - 4.2.2** Re-circulation devices within distribution system storage facilities;

- 4.2.3 In-line mixing equipment;
 - 4.2.4 Chemical metering pumps and chemical handling pumps;
 - 4.2.5 Chemical storage tanks (excluding fuel storage tanks) and associated equipment; or,
 - 4.2.6 Measuring and monitoring devices that are not required by regulation, by a condition in the Drinking Water Works Permit, or by a condition otherwise imposed by the Ministry of the Environment and Climate Change.
- 4.3** The drinking water system may be altered by replacing the following:
- 4.3.1 Raw water piping, treatment process piping or treated water piping within the treatment subsystem;
 - 4.3.2 Fuel storage tanks and spill containment works, and associated equipment; or
 - 4.3.3 Coagulants and pH adjustment chemicals, where the replacement chemicals perform the same function;
 - a) Prior to making any alteration to the drinking water system under condition 4.3.3, the owner shall undertake a review of the impacts that the alteration might have on corrosion control or other treatment processes; and
 - b) The owner shall notify the Director in writing within thirty (30) days of any alteration made under condition 4.3.3 and shall provide the Director with a copy of the review.
- 4.4** Any alteration of the drinking water system made under conditions 4.1, 4.2 or 4.3 shall not result in:
- 4.4.1 An exceedance of a treatment subsystem rated capacity or a treatment subsystem component maximum flow rate as specified in the licence;
 - 4.4.2 The bypassing of any unit process within a treatment subsystem;
 - 4.4.3 A deterioration in the quality of drinking water provided to consumers;
 - 4.4.4 A reduction in the reliability or redundancy of any component of the drinking water system;
 - 4.4.5 A negative impact on the ability to undertake compliance and other monitoring necessary for the operation of the drinking water system; or
 - 4.4.6 An adverse effect on the environment.
- 4.5** The owner shall verify in writing that any addition, modification, replacement or removal of drinking water system components in accordance with conditions 4.1, 4.2 or 4.3 has met the requirements of the conditions listed in condition 4.4.

- 4.6** The verifications and documentation required in condition 4.5 shall be:
- 4.6.1** Recorded on "Form 2 – Record of Minor Modifications or Replacements to the Drinking Water System", as published by the Ministry of the Environment and Climate Change, prior to the modified or replaced components being placed into service; and
 - 4.6.2** Retained for a period of ten (10) years by the owner.
- 4.7** For greater certainty, the verification requirements set out in conditions 4.5 and 4.6 do not apply to any addition, modification, replacement or removal in respect of the drinking water system which:
- 4.7.1** Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03; or
 - 4.7.2** Constitutes maintenance or repair of the drinking water system.
- 4.8** The owner shall update any drawings maintained for the drinking water system to reflect the modification or replacement of the works, where applicable.

5.0 Equipment with Emissions to the Air

- 5.1** The drinking water system may be altered by adding, modifying or replacing any of the following drinking water system components that may discharge or alter the rate or manner of a discharge of a compound of concern to the atmosphere:
- 5.1.1** Any equipment, apparatus, mechanism or thing that is used for the transfer of outdoor air into a building or structure that is not a cooling tower;
 - 5.1.2** Any equipment, apparatus, mechanism or thing that is used for the transfer of indoor air out of a space used for the production, processing, repair, maintenance or storage of goods or materials, including chemical storage;
 - 5.1.3** Laboratory fume hoods used for drinking water testing, quality control and quality assurance purposes;
 - 5.1.4** Low temperature handling of compounds with a vapor pressure of less than 1 kilopascal;
 - 5.1.5** Maintenance welding stations;
 - 5.1.6** Minor painting operations used for maintenance purposes;
 - 5.1.7** Parts washers for maintenance shops;
 - 5.1.8** Emergency chlorine and ammonia gas scrubbers and absorbers;
 - 5.1.9** Venting for activated carbon units for drinking water taste and odour control;
 - 5.1.10** Venting for a stripping unit for methane removal from a groundwater supply;
 - 5.1.11** Venting for an ozone treatment unit;

- 5.1.12 Natural gas or propane fired boilers, water heaters, space heaters and make-up air units with a total facility-wide heat input rating of less than 20 million kilojoules per hour, and with an individual fuel energy input of less than or equal to 10.5 gigajoules per hour; or
 - 5.1.13 Emergency generators that fire No. 2 fuel oil (diesel fuel) with a sulphur content of 0.5 per cent or less measured by weight, natural gas, propane, gasoline or biofuel, and that are used for emergency duty only with periodic testing.
- 5.2** The owner shall not add, modify or replace a drinking water system component set out in condition 5.1 for an activity that is not directly related to the treatment and/or distribution of drinking water.
- 5.3** The emergency generators identified in condition 5.1.13 shall not be used for non-emergency purposes including the generation of electricity for sale or for peak shaving purposes.
- 5.4** The owner shall prepare an emission summary table for nitrogen oxide emissions only, for each addition, modification or replacement of emergency generators identified in condition 5.1.13.

Performance Limits

- 5.5** The owner shall ensure that a drinking water system component identified in conditions 5.1.1 to 5.1.13 is operated at all times to comply with the following limits:
- 5.5.1 For equipment other than emergency generators, the maximum concentration of any compound of concern at a point of impingement shall not exceed the corresponding point of impingement limit;
 - 5.5.2 For emergency generators, the maximum concentration of nitrogen oxides at sensitive populations shall not exceed the applicable point of impingement limit, and at non-sensitive populations shall not exceed the Ministry of the Environment and Climate Change half-hourly screening level of 1880 ug/m³ as amended; and
 - 5.5.3 The noise emissions comply at all times with the limits set out in publication NPC-300, as applicable.
- 5.6** The owner shall verify in writing that any addition, modification or replacement of works in accordance with condition 5.1 has met the requirements of the conditions listed in condition 5.5.
- 5.7** The owner shall document how compliance with the performance limits outlined in condition 5.5.3 is being achieved, through noise abatement equipment and/or operational procedures.
- 5.8** The verifications and documentation required in conditions 5.6 and 5.7 shall be:
- 5.8.1 Recorded on "Form 3 – Record of Addition, Modification or Replacement of Equipment Discharging a Contaminant of Concern to the Atmosphere", as published by the Ministry of the Environment and Climate Change, prior to the additional, modified or replacement equipment being placed into service; and

- 5.8.2 Retained for a period of ten (10) years by the owner.
- 5.9** For greater certainty, the verification and documentation requirements set out in conditions 5.6 and 5.8 do not apply to any addition, modification or replacement in respect of the drinking water system which:
- 5.9.1 Is exempt from subsection 31(1) of the SDWA by subsection 9.(2) of O. Reg. 170/03; or
 - 5.9.2 Constitutes maintenance or repair of the drinking water system.
- 5.10** The owner shall update any drawings maintained for the works to reflect the addition, modification or replacement of the works, where applicable.

6.0 Previously Approved Works

- 6.1** The owner may add, modify, replace or extend, and operate part of a municipal drinking water system if:
- 6.1.1 An approval was issued after January 1, 2004 under section 36 of the SDWA in respect of the addition, modification, replacement or extension and operation of that part of the municipal drinking water system;
 - 6.1.2 The approval expired by virtue of subsection 36(4) of the SDWA; and
 - 6.1.3 The addition, modification, replacement or extension commenced within five years of the date that activity was approved by the expired approval.

7.0 System-Specific Conditions

- 7.1** Not applicable.

8.0 Source Protection

- 8.1** Not applicable.

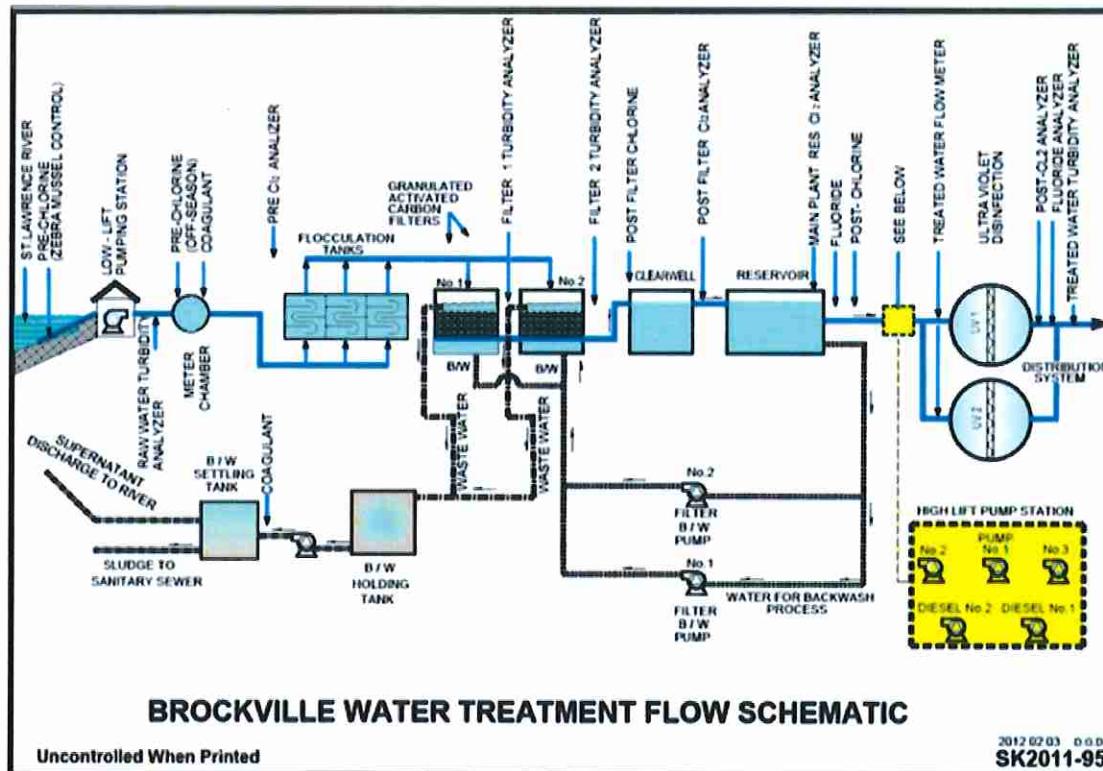
Schedule D: Process Flow Diagrams

System Owner	The Corporation of the City of Brockville
Permit Number	152-201
Drinking Water System Name	Brockville Drinking Water System
Schedule D Issue Date	June 27th, 2016

1.0 Process Flow Diagrams

Brockville Water Treatment Facility

FIGURE 6.1 BROCKVILLE DRINKING WATER SYSTEM PROCESS DIAGRAM



[Source: City of Brockville Drinking Water System Operational Plan, Version 7, 19 May 2015]



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report**

APPENDIX B

PERMIT TO TAKE WATER



Ministry of the Environment
 Eastern Region
 Technical Support Section
 Water Resources
 1259 Gardiners Rd, PO Box 22032
 Kingston, ON
 K7P 3J6
 Tel: (613) 549-4000

Ministère de l'Environnement
 Direction régionale de l'Est
 Section du Soutien Technique
 Ressource en eau
 1259 Chemin Gardiners, CP 22032
 Kingston, ON
 K7P 3J6
 Tél:(613) 549-4000

March 18, 2014

Mr. Peter Raabe
 The Corporation of the City of Brockville
 1 King Street West
 Post Office Box 5000
 Brockville, Ontario
 K6V 7A5

Dear Mr. Raabe:

RE: Permit To Take Water 2346-9H7NEF
 Brockville Water Treatment Plant
 20 Rivers Avenue
 Brockville, United Counties of Leeds and Grenville
 Reference Number 2374-9ESQKH

Please find attached Permit to Take Water 2346-9H7NEF which authorizes the withdrawal of water in accordance with the application for this Permit to Take Water, dated December 17, 2013and signed by Peter Raabe.

Please note that the Permit expires March 31, 2024 and cancels and replaces Permit Number 8577-5ZCP45.

Ontario Regulation 387/04 (Water Taking) requires all water takers to report daily water taking amounts to the Water Taking Reporting System (WTRS) electronic database: <http://www.ene.gov.on.ca/envision/water/pttw.htm>. Daily water taking must be reported on a calendar year basis. If no water is taken, then a “no taking” report must be entered. Please consult the Regulation and Section 4 of this Permit for monitoring requirements.

If you have questions about reporting requirements, please call the WTRS Help Desk at 416-235-6322 (toll free: 1-877-344-2011) or by email, WTRSHelpdesk@ontario.ca. It is preferred that you submit your data directly and electronically to the WTRS. Where this is impracticable, please use the Water Taking Submission Form (included as Appendix C of the *Technical Bulletin: Permit To Take Water (PTTW) - Monitoring and Reporting of Water Takings*), which can be downloaded from the above web site, and fax your completed forms to 416-235-6549 or mail them to: Water User Reporting Section, 125 Resources Road, Toronto, Ontario M9P 3V6.

Take notice that in issuing this Permit, terms and conditions pertaining to the taking of water and to the results of the taking have been imposed. The terms and conditions have been designed to allow for the development of water resources, while providing reasonable protection to existing water uses and users.

Yours truly,



Gillian Dagg-Foster
Director, Section 34, Ontario Water Resources Act, R.S.O. 1990

Eastern Region

File Storage Number: SI 2346 220 (TS)

c: Don Richards, City of Brockville, drichards@brockville.com

Kingston District Office (via email)



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report**

APPENDIX C
INSPECTION RATING RECORD

Ministry of the Environment - Inspection Summary Rating Record (Reporting Year - 2017-2018)

DWS Name: BROCKVILLE DRINKING WATER SYSTEM
DWS Number: 220001263
DWS Owner: Brockville, The Corporation Of The City Of
Municipal Location: Brockville

Regulation: O.REG 170/03
Category: Large Municipal Residential System
Type Of Inspection: Focused
Inspection Date: June 27, 2017
Ministry Office: Kingston District

Maximum Question Rating: 543

Inspection Module	Non-Compliance Rating
Capacity Assessment	0 / 30
Treatment Processes	0 / 85
Operations Manuals	0 / 28
Logbooks	0 / 14
Certification and Training	0 / 42
Water Quality Monitoring	0 / 124
Reporting & Corrective Actions	0 / 87
Treatment Process Monitoring	0 / 133
TOTAL	0 / 543

Inspection Risk Rating: 0.00%**FINAL INSPECTION RATING:** 100.00%

Ministry of the Environment - Detailed Inspection Rating Record (Reporting Year - 2017-2018)**DWS Name:** BROCKVILLE DRINKING WATER SYSTEM**DWS Number:** 220001263**DWS Owner:** Brockville, The Corporation Of The City Of**Municipal Location:** Brockville**Regulation:** O.REG 170/03**Category:** Large Municipal Residential System**Type Of Inspection:** Focused**Inspection Date:** June 27, 2017**Ministry Office:** Kingston District**Maximum Question Rating:** 543**Inspection Risk Rating:** 0.00%**FINAL INSPECTION RATING:** 100.00%



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report**

APPENDIX D
INSPECTION RATING RECORD METHODOLOGY

APPLICATION OF THE RISK METHODOLOGY USED FOR MEASURING MUNICIPAL RESIDENTIAL DRINKING WATER SYSTEM INSPECTION RESULTS



The Ministry of the Environment (MOE) has a rigorous and comprehensive inspection program for municipal residential drinking water systems (MRDWS). Its objective is to determine the compliance of MRDWS with requirements under the Safe Drinking Water Act and associated regulations. It is the responsibility of the municipal residential drinking water system owner to ensure their drinking water systems are in compliance with all applicable legal requirements.

This document describes the risk rating methodology, which has been applied to the findings of the Ministry's MRDWS inspection

results since fiscal year 2008-09. The primary goals of this assessment are to encourage ongoing improvement of these systems and to establish a way to measure this progress.

MOE reviews the risk rating methodology every three years.

The Ministry's Municipal Residential Drinking Water Inspection Protocol contains 15 inspection modules consisting of approximately 100 regulatory questions. Those protocol questions are also linked to definitive guidance that ministry inspectors use when conducting MRDWS inspections.

ontario.ca/drinkingwater

The questions address a wide range of regulatory issues, from administrative procedures to drinking water quality monitoring. The inspection protocol also contains a number of non-regulatory questions.

A team of drinking water specialists in the ministry assessed each of the inspection protocol regulatory questions to determine the risk (not complying with the regulation) to the delivery of safe drinking water. This assessment was based on established provincial risk assessment principles, with each question receiving a risk rating referred to as the Question Risk Rating. Based on the number of areas where a system is deemed to be non-compliant during the inspection, and the significance of these areas to administrative, environmental, and health consequences, a risk-based inspection rating is calculated by the ministry for each drinking water system.

It is important to be aware that an inspection rating less than 100 per cent does not mean the drinking water from the system is unsafe. It shows areas where a system's operation can improve. The ministry works with owners and operators of systems to make sure they know what they need to do to achieve full compliance.

The inspection rating reflects the inspection results of the specific drinking water system for the reporting year. Since the methodology is applied consistently over a period of years, it serves as a comparative measure both provincially and in relation to the individual system. Both the drinking water system and the public are able to track the performance over time, which encourages continuous improvement and allows systems to identify specific areas requiring attention.

The ministry's annual inspection program is an important aspect of our drinking water safety net. The ministry and its partners share a common commitment to excellence and we continue to work toward the goal of 100 per cent regulatory compliance.

Determining Potential to Compromise the Delivery of Safe Water

The risk management approach used for MRDWS is aligned with the Government of Ontario's Risk Management Framework. Risk management is a systematic approach to identifying potential hazards, understanding the likelihood and consequences of the hazards, and taking steps to reduce their risk if necessary and as appropriate.

The Risk Management Framework provides a formula to be used in the determination of risk:

$$\text{RISK} = \text{LIKELIHOOD} \times \text{CONSEQUENCE}$$

(of the consequence)

Every regulatory question in the inspection protocol possesses a likelihood value (L) for an assigned consequence value (C) as described in **Table 1** and **Table 2**.

TABLE 1:

Likelihood of Consequence Occurring	Likelihood Value
0% - 0.99% (Possible but Highly Unlikely)	L = 0
1 – 10% (Unlikely)	L = 1
11 – 49% (Possible)	L = 2
50 – 89% (Likely)	L = 3
90 – 100% (Almost Certain)	L = 4

TABLE 2:

Consequence	Consequence Value
Medium Administrative Consequence	C = 1
Major Administrative Consequence	C = 2
Minor Environmental Consequence	C = 3
Minor Health Consequence	C = 4
Medium Environmental Consequence	C = 5
Major Environmental Consequence	C = 6
Medium Health Consequence	C = 7
Major Health Consequence	C = 8

The consequence values (0 through 8) are selected to align with other risk-based programs and projects currently under development or in use within the ministry as outlined in **Table 2**.

The Question Risk Rating for each regulatory inspection question is derived from an evaluation of every identified consequence and its corresponding likelihood of occurrence:

- All levels of consequence are evaluated for their potential to occur
- Greatest of all the combinations is selected.

The Question Risk Rating quantifies the risk of non-compliance of each question relative to the others. Questions with higher values are those with a potentially more significant impact on drinking water safety and a higher likelihood of occurrence. The highest possible value would be 32 (4×8) and the lowest would be 0 (0×1).

Table 3 presents a sample question showing the risk rating determination process.

TABLE 3:

Does the Operator in Charge ensure that the equipment and processes are monitored, inspected and evaluated?							
Risk = Likelihood × Consequence							
C=1	C=2	C=3	C=4	C=5	C=6	C=7	C=8
Medium Administrative Consequence	Major Administrative Consequence	Minor Environmental Consequence	Minor Health Consequence	Medium Environmental Consequence	Major Environmental Consequence	Medium Health Consequence	Major Health Consequence
L=4 (Almost Certain)	L=1 (Unlikely)	L=2 (Possible)	L=3 (Likely)	L=3 (Likely)	L=1 (Unlikely)	L=3 (Likely)	L=2 (Possible)
R=4	R=2	R=6	R=12	R=15	R=6	R=21	R=16

Application of the Methodology to Inspection Results

Based on the results of a MRDWS inspection, an overall inspection risk rating is calculated. During an inspection, inspectors answer the questions related to regulatory compliance and input their "yes", "no" or "not applicable" responses into the Ministry's Laboratory and Waterworks Inspection System (LWIS) database. A "no" response indicates non-compliance. The maximum number of regulatory questions asked by an inspector varies by: system (i.e., distribution, stand-alone); type of inspection (i.e., focused, detailed); and source type (i.e., groundwater, surface water).

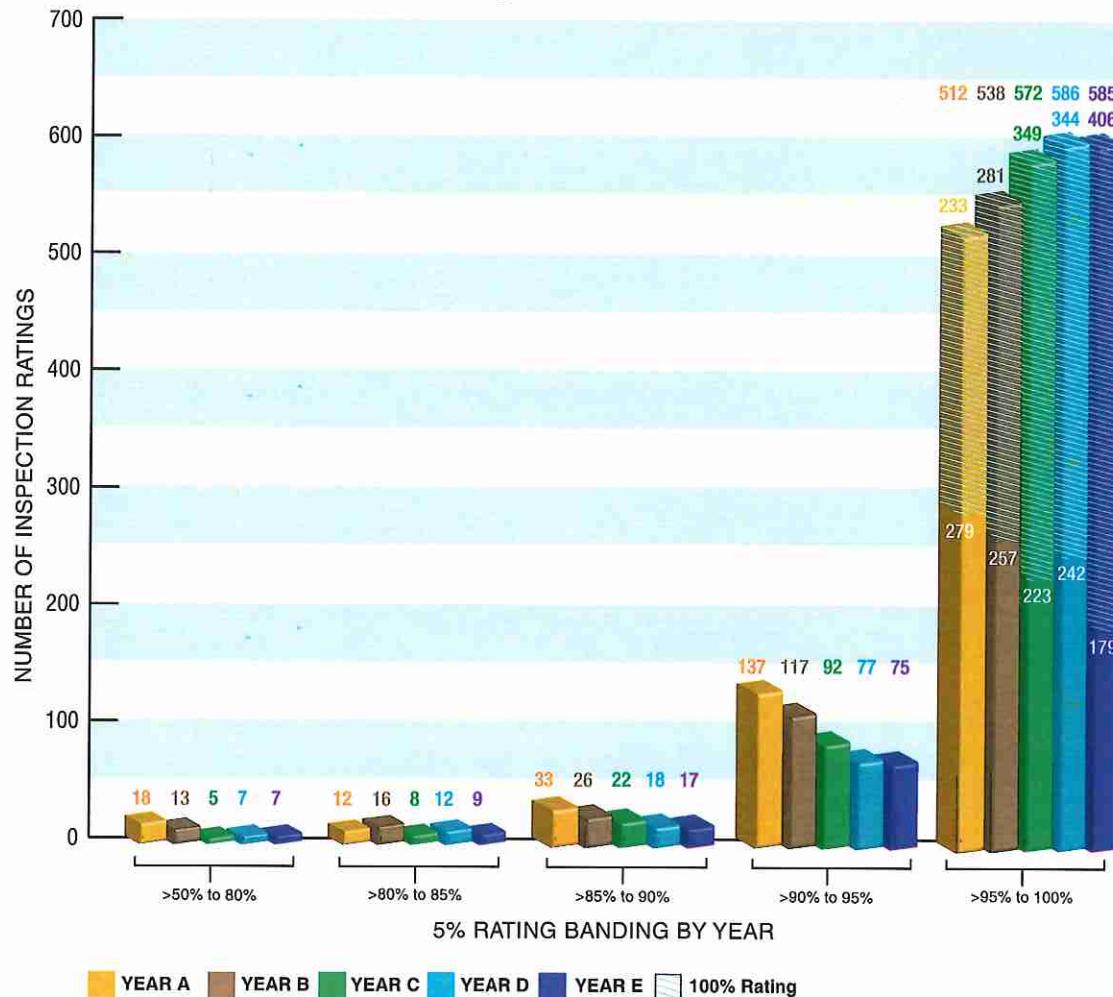
The risk ratings of all non-compliant answers are summed and divided by the sum of the risk ratings of all questions asked (maximum question rating). The resulting inspection risk rating (as a percentage) is subtracted from 100 per cent to arrive at the final inspection rating.

Application of the Methodology for Public Reporting

The individual MRDWS Total Inspection Ratings are published with the ministry's Chief Drinking Water Inspector's Annual Report.

Figure 1 presents the distribution of MRDWS ratings for a sample of annual inspections. Individual drinking water systems can compare against all the other inspected facilities over a period of inspection years.

Figure 1: Year Over Year Distribution of MRDWS Ratings



Reporting Results to MRDWS Owners/Operators

A summary of inspection findings for each system is generated in the form of an Inspection Rating Record (IRR). The findings are grouped into the 15 possible modules of the inspection protocol,

which would provide the system owner/operator with information on the areas where they need to improve. The 15 modules are:

1. Source
2. Permit to Take Water
3. Capacity Assessment
4. Treatment Processes
5. Treatment Process Monitoring
6. Process Wastewater
7. Distribution System
8. Operations Manuals
9. Logbooks
10. Contingency and Emergency Planning
11. Consumer Relations
12. Certification and Training
13. Water Quality Monitoring
14. Reporting, Notification and Corrective Actions
15. Other Inspection Findings

For further information, please visit www.ontario.ca/drinkingwater



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report**

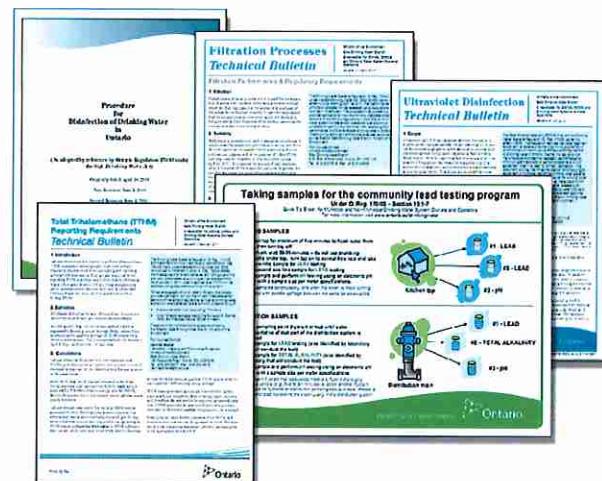
**APPENDIX E
STAKEHOLDER APPENDIX**

Key Reference and Guidance Material for Municipal Residential Drinking Water Systems

Many useful materials are available to help you operate your drinking water system. Below is a list of key materials owners and operators of municipal residential drinking water systems frequently use.

To access these materials online click on their titles in the table below or use your web browser to search for their titles. Contact the Public Information Centre if you need assistance or have questions at 1-800-565-4923/416-325-4000 or picemail.moe@ontario.ca.

For more information on Ontario's drinking water visit www.ontario.ca/drinkingwater and email drinking.water@ontario.ca to subscribe to drinking water news.



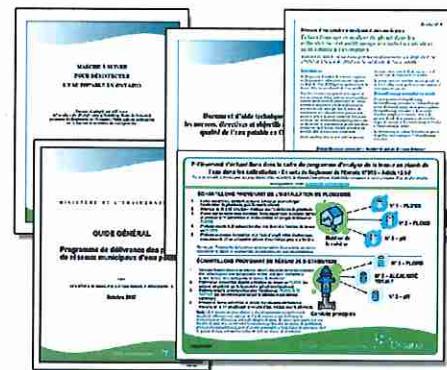
PUBLICATION TITLE	PUBLICATION NUMBER
Taking Care of Your Drinking Water: A Guide for Members of Municipal Councils	7889e01
FORMS: Drinking Water System Profile Information, Laboratory Services Notification, Adverse Test Result Notification Form	7419e, 5387e, 4444e
Procedure for Disinfection of Drinking Water in Ontario	4448e01
Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids	7152e
Total Trihalomethane (TTHM) Reporting Requirements Technical Bulletin (February 2011)	8215e
Filtration Processes Technical Bulletin	7467
Ultraviolet Disinfection Technical Bulletin	7685
Guide for Applying for Drinking Water Works Permit Amendments, Licence Amendments, Licence Renewals and New System Applications	7014e01
Certification Guide for Operators and Water Quality Analysts	
Guide to Drinking Water Operator Training Requirements	9802e
Taking Samples for the Community Lead Testing Program	6560e01
Community Sampling and Testing for Lead: Standard and Reduced Sampling and Eligibility for Exemption	7423e
Guide: Requesting Regulatory Relief from Lead Sampling Requirements	6610
Drinking Water System Contact List	7128e
Technical Support Document for Ontario Drinking Water Quality Standards	4449e01

ontario.ca/drinkingwater

Principaux guides et documents de référence sur les réseaux résidentiels municipaux d'eau potable

De nombreux documents utiles peuvent vous aider à exploiter votre réseau d'eau potable. Vous trouverez ci-après une liste de documents que les propriétaires et exploitants de réseaux résidentiels municipaux d'eau potable utilisent fréquemment.

Pour accéder à ces documents en ligne, cliquez sur leur titre dans le tableau ci-dessous ou faites une recherche à l'aide de votre navigateur Web. Communiquez avec le Centre d'information au public au 1 800 565-4923 ou au 416 325-4000, ou encore à picemail.moe@ontario.ca si vous avez des questions ou besoin d'aide.



Pour plus de renseignements sur l'eau potable en Ontario, consultez le site www.ontario.ca/eaupotable ou envoyez un courriel à drinking.water@ontario.ca pour suivre l'information sur l'eau potable.

TITRE DE LA PUBLICATION	NUMÉRO DE PUBLICATION
Prendre soin de votre eau potable – Un guide destiné aux membres des conseils municipaux	7889f01
Renseignements sur le profil du réseau d'eau potable, Avis de demande de services de laboratoire, Formulaire de communication de résultats d'analyse insatisfaisants et du règlement des problèmes	7419f, 5387f, 4444f
Marche à suivre pour désinfecter l'eau potable en Ontario	4448f01
Strategies for Minimizing the Disinfection Products Trihalomethanes and Haloacetic Acids (en anglais seulement)	7152e
Total Trihalomethane (TTHM) Reporting Requirements: Technical Bulletin (février 2011) (en anglais seulement)	8215e
Filtration Processes Technical Bulletin (en anglais seulement)	7467
Ultraviolet Disinfection Technical Bulletin (en anglais seulement)	7685
Guide de présentation d'une demande de modification du permis d'aménagement de station de production d'eau potable, de modification du permis de réseau municipal d'eau potable, de renouvellement du permis de réseau municipal d'eau potable et de permis pour un nouveau réseau	7014f01
Guide sur l'accréditation des exploitants de réseaux d'eau potable et des analystes de la qualité de l'eau de réseaux d'eau potable	
Guide sur les exigences relatives à la formation des exploitants de réseaux d'eau potable	9802f
Prélèvement d'échantillons dans le cadre du programme d'analyse de la teneur en plomb de l'eau dans les collectivités	6560f01
Échantillonnage et analyse du plomb dans les collectivités : échantillonnage normalisé ou réduit et admissibilité à l'exemption	7423f
Guide: Requesting Regulatory Relief from Lead Sampling Requirements (en anglais seulement)	6610
Liste des personnes-ressources du réseau d'eau potable	7128f
Document d'aide technique pour les normes, directives et objectifs associés à la qualité de l'eau potable en Ontario	4449f01

ontario.ca/eaupotable

emerging industry standards. Please note that items which appear as recommended actions do not, in themselves, constitute violations. ***There are no "Actions Required" coming out of this report.***

In order to measure individual inspection results, the ministry continues to adhere to an inspection compliance risk framework based on the principles of the Inspection, Investigation & Enforcement (II&E) Secretariat and advice of internal/external risk experts. The Inspection Rating Record (IRR), appended to the inspection report, provides the ministry, the system owner and the local Public Health Unit with a summarized quantitative measure of the drinking water system's annual inspection and regulated water quality testing performance.

Please note the IRR methodology document, also appended to the inspection report, describes how the risk model was improved to better reflect any health related and administrative non-compliance issues that may be cited in our inspection reports. IRR ratings are published in the ministry's Chief Drinking Water Inspector's Annual Report. If you have any questions or concerns regarding the rating, please contact Jim Mahoney, Water Compliance Supervisor, at 613-548-6902.

Section 19 of the *Safe Drinking Water Act, 2002* (Standard of Care) cites a number of obligations of individuals who exercise decision-making authority over municipal drinking water systems. The ministry encourages individuals, particularly municipal councilors, to take steps to be well informed about the drinking water systems over which they have decision-making authority. These steps could include asking for a copy of this inspection report and a review of its findings.

Thank you for the assistance afforded to me during the conduct of the compliance assessment. Should you have any questions regarding the content of the enclosed report, please do not hesitate to contact me.

Yours truly,



Suzanne Smith
Water Inspector/Provincial Officer Badge # 1511
SS

Enclosure

- ec: Peter Raabe, Director, Environmental Services Department, City of Brockville, PO Box 5000, 1 King Street West, Brockville, ON, K6V 7A5, Email: praabe@brockville.com
- Don Richards, Supervisor, Water Systems, Water Systems Division, Environmental Services Department, City of Brockville, PO Box 5000, 1 King Street West, Brockville, ON, K6V 7A5 Email: drichards@brockville.com
- Jason Barlow, Chief Operator, Water Systems, Water Systems Division, Environmental Services Department, City of Brockville, PO Box 5000, 1 King Street West, Brockville, ON, K6V 7A5, Email: jbarlow@brockville.com
- Joan Mays, Manager of Community Health Protection, Leeds, Grenville & Lanark District Health Unit, 458 Laurier Boulevard, Brockville, ON K6V 7A3, E-mail: joan.mays@healthunit.org
- Jane Lyster, Director of Health Protection, Leeds, Grenville & Lanark District Health Unit, 458 Laurier Boulevard, Brockville, ON K6V 7A3, E-mail: jane.lyster@healthunit.org
- Rob McRae, Watershed Planning Coordinator, Cataraqui Region Conservation Authority, P.O. Box 160, Glenburnie, ON K0H 1S0, E-mail: rmcrae@cataraquiregion.on.ca
- c: File SI-ST-CO-SE 540 (2017) Brockville Drinking Water System
220001263



Ministry of the Environment and Climate Change

BROCKVILLE DRINKING WATER SYSTEM
Inspection Report

Site Number: 220001263
Inspection Number: 1-FM3I1
Date of Inspection: Jun 27, 2017
Inspected By: Suzanne Smith



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report**

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OWNER INFORMATION:

Company Name: BROCKVILLE, THE CORPORATION OF THE CITY OF
Street Number: 1 **Unit Identifier:**
Street Name: KING St W
City: BROCKVILLE
Province: ON **Postal Code:** K6V 7A5

CONTACT INFORMATION

Type:	Owner	Name:	Bob Casselman
Phone:	(613) 342-8772	Fax:	(613) 342-8780
Email:	bcasselma@brockville.com		
Title:	City Manager, City of Brockville		
Type:	Owner	Name:	Peter Raabe
Phone:	(613) 342-8772	Fax:	(613) 342-5035
Email:	praabe@brockville.com		
Title:	Director, Environmental Services Department, City of Brockville		
Type:	Main Contact	Name:	Don Richards
Phone:	(613) 342-8772	Fax:	(613) 345-6163
Email:	drichards@brockville.com		
Title:	Supervisor Water Systems, Environmental Services Department, City of Brockville		
Type:	Operating Authority	Name:	Jason Barlow
Phone:	(613) 342-8772	Fax:	(613) 345-6163
Email:	jbarlow@brockville.com		
Title:	Chief Operator Water Systems, Environmental Services Department, City of Brockville		
Type:	Other - Municipality	Name:	Yvonne L. Robert
Phone:	(613) 345-7480	Fax:	(613) 345-7235
Email:	yrobert@elizabethtown-kitley.on.ca		
Title:	Administrator Clerk, The Township of Elizabethtown-Kitley		
Type:	Other - Health Unit	Name:	Jane Lyster
Phone:	(613) 345-5685	Fax:	(613) 345-2879
Email:	jane.lyster@healthunit.org		
Title:	Director, Health Protection, Leeds, Grenville and Lanark District Health Unit		
Type:	Other - Health Unit	Name:	Joan Mays
Phone:	(613) 345-5685	Fax:	(613) 345-2876
Email:	joan.mays@healthunit.org		
Title:	Manager of Community Health Protection Leeds, Grenville and Lanark District Health Unit		
Type:	Conservation Authority	Name:	Rob McRae
Phone:	(613) 546-4228	Fax:	(613) 547-6474
Email:	robmcrae@cataraquieregion.on.ca		
Title:	Project Manager, Source Water Protection		



INSPECTION DETAILS:

Site Name:	BROCKVILLE DRINKING WATER SYSTEM
Site Address:	20 RIVER AVE BROCKVILLE K6V 5R9
County/District:	Brockville
MOECC District/Area Office:	Kingston District
Health Unit:	LEEDS, GRENVILLE AND LANARK DISTRICT HEALTH UNIT
Conservation Authority:	
MNR Office:	
Category:	Large Municipal Residential
Site Number:	220001263
Inspection Type:	Announced
Inspection Number:	1-FM3I1
Date of Inspection:	Jun 27, 2017
Date of Previous Inspection:	Jun 28, 2016

COMPONENTS DESCRIPTION

Site (Name): Raw Water/Intake
Type: Source

Sub Type: Surface Water

Comments:

The Brockville Drinking Water System obtains raw water for processing into drinking water from the St. Lawrence River.

Raw water is delivered to the treatment process through a 900 millimetre (mm) diameter intake pipe. The intake extends approximately 294 metres (m) into the St. Lawrence River. The intake pipe connects to a crib fitted with a chlorine solution diffuser for Zebra Mussel control.

Water flows by gravity through the intake crib and pipe, and through a screen chamber. The screens remove debris that may be swept into the St. Lawrence River and drawn through the intake, and would otherwise gain access to, and damage pumps and treatment equipment.

Screened water flows into a low lift well located beneath a low lift pumping station. The water is pumped from the low lift well using a combination of three (diesel/electric driven) low lift pumps equipped with variable frequency drives to the treatment process building through a transmission line. The raw water transmission line is equipped with a venturi flow measurement device located within a metering chamber. Chlorine gas is delivered to the intake diffuser through two 50 mm diameter feed lines for zebra mussel control. The intake chlorination system is typically activated when the raw water temperature is equal to, or greater than 10°C.

Site (Name): Treated Water/Treatment Processes
Type: Treated Water POE

Sub Type: Treatment Facility

Comments:

The Brockville Water Treatment Plant (WTP) is a direct filtration plant and includes unit processes consisting of coagulation-flocculation, filtration and disinfection. The drinking water system is approved to treat water at a maximum daily flow rate into the distribution system of 36,400 cubic metres per day (m³/d).

Polyaluminum chloride (PAC) and chlorine are injected at the metering chamber to provide coagulation and pre-chlorination. Mixing is provided as the water passes through the chamber to the WTP building. Coagulated water enters three two-celled spiral up-flow flocculation tanks where finer particles collide and grow (agglomerate) with the aid of gentle mixing into large particles to enable removal by filtration.



Ministry of the Environment and Climate Change Inspection Report

Filtration is provided by two dual media filters, consisting of a 600 mm layer of granular activated carbon, a 300 mm layer of silica sand and underdrains. The granular activated carbon media also serves to remove taste and odour causing compounds (Geosmin and 2-Methylisoborneol (MIB)) typically experienced in the raw water from the Great Lakes - St. Lawrence River basin in late summer and fall. The filtration process is not equipped with filter-to-waste capability. The Engineer's Report, prepared in 2000, identified that the filtered water turbidity rarely exceeds 0.2 NTU and most often is below 0.1 NTU. It was recommended that filter-to-waste capability should be installed in the long term plant upgrades.

Filter effluent (filtered water) is injected with chlorine to provide primary disinfection, as it enters a 300 cubic metre (m³) clearwell/reservoir system consisting of one chlorine contact clearwell followed by one in-ground 3,500 m³ curtain-baffled reservoir. Treated water is pumped from the reservoir via a series of five high lift pumps (three electric and two diesel driven pumps). Chlorine is injected for trim chlorination and hydrofluosilicic acid is injected to provide fluoridation at the high lift pump well, on the suction side of the pumps.

The high lift pumps then direct water through one of two (one duty and one stand-by) ultraviolet disinfection (UV) reactors (Trojan UV Swift). The UV reactors may be operated continuously to boost the primary disinfection capability of the drinking water treatment system or be operated as a backup for disinfection. Each UV disinfection reactor is rated to apply a dosage of 40 millijoules per square centimetre (mJ/cm²) at a design flow rate of 36,400 cubic metres per day. Following the UV reactors, the treated water is discharged to the distribution system.

Site (Name): Distribution System

Type: Other

Sub Type: Other

Comments:

The Brockville distribution system services a population of approximately 22,000 persons. The Brockville Drinking Water System (donor) also supplies treated water to approximately 350 residents in the surrounding Township of Elizabethtown-Kitley via a connected distribution system (receiver) owned by the Township of Elizabethtown-Kitley. As of the summer of 2010, the City of Brockville began operating the Elizabethtown-Kitley distribution system under an agreement made in accordance with section 5(4) of O.Reg. 170/03.

The Brockville distribution system includes: an elevated steel storage tank (Perth Street Elevated Storage Tank); one combination in-ground reservoir/pumping station and rechlorination facility (Parkdale Avenue Reservoir, Pumping Station & Rechlorination Facility); two booster stations (First Avenue Pumping Station and Sunset Boulevard Pumping Station); 830 hydrants and 140 kilometres (km) of water mains.

The system is divided into three pressure zones known as Zone 1 (south of Highway 401), Zone 2 (north of highway 401) and Zone 3 (first ave, west end). The fourth zone includes the Elizabethtown-Kitley Distribution system, which also includes the Lily Bay Booster Station.

Site (Name): Perth Street Elevated Storage Tank

Type: Other

Sub Type: Reservoir

Comments:

The Perth Street elevated storage tank is located near the intersection of Perth and Chaffey Streets. The tank is a welded-steel bowl style storage structure. The elevated storage tank has a total volume of 1,900 m³.

Site (Name): Parkdale Avenue Reservoir, Pumping Station & Rechlorination Facility

Type: Other

Sub Type: Reservoir

Comments:

The Parkdale Avenue Reservoir, Pumping Station & Rechlorination Facility is located immediately north of Parkdale Avenue and west of California Avenue. The facility consists of:

- a 7600 m³ capacity at-grade, single celled, unbaffled, concrete reservoir with a submersible mixer;



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- a pumping system for Zone 1 including inlet and outlet piping, an inlet control valve, suction and discharge headers, variable frequency drive electrically driven centrifugal pumps and a diesel driven centrifugal pump, and a common discharge header to Zone 1;

A pumping system for Zone 2 including a suction header/transfer pipe from the Zone 1 discharge header, variable frequency drive electrically driven pumps, and a common discharge header to Zone 2:

- a sodium hypochlorite feed system consisting of two chemical metering pumps and a single polyethylene solution storage tank with containment for boosting free chlorine residual in Zone 2; and

- a 200 kilowatt (kW) standby diesel generator with a double-walled fuel storage and supply tank.

The Parkedale Avenue Reservoir is monitored using the following instrumentation:

- One continuous free chlorine residual analyzer (HACH CL17), sampling from the reservoir discharge header;
- Two differential pressure/flow transmitters (high & low flow) for measuring flow from the Parkedale Avenue Reservoir to Zone 2; and

- One differential pressure transmitter for monitoring the level in the reservoir.

The instrumentation described above transmits data and alarm signals to the water treatment plant's Supervisory Control and Data Acquisition (SCADA) system for remote monitoring.

Site (Name): First Avenue Pumping Station

Type: Other

Sub Type: Booster Station

Comments:

The First Avenue Pumping Station consists of two variable frequency drive controlled centrifugal pumps and inlet and outlet piping. The pumps are controlled to maintain a pressure of 455 kilopascals (kPa) or 65 pounds per square inch (psi). The equipment is located in a secure concrete building.

Site (Name): Sunset Boulevard Pumping Station

Type: Other

Sub Type: Booster Station

Comments:

The Sunset Boulevard Pumping Station is located near the intersection of Sunset Boulevard and Reynolds Drive. The booster station consists of two centrifugal pumps and inlet and outlet piping. The pumps and piping are located within an in-ground concrete vault.

Site (Name): Water Treatment Residual Process Wastewater

Type: Other

Sub Type: Surface Water

Comments:

Process wastewater produced by backwashing filters enters a 400 m³ backwash wastewater holding tank equipped with two transfer pumps. The transfer pumps convey the process wastewater to a single 84 m³ backwash wastewater settling tank. Poly-aluminum chloride (Stern PAC) is injected into the process wastewater stream from a chemical metering system consisting of a day tank and single chemical metering pump to promote coagulation and settling as it enters the settling tank.

Supernatant (effluent) from the settling tank overflows to the St. Lawrence River, while settled solids are pumped to the Brockville sanitary sewer system using a single sludge transfer pump. Currently, sodium thiosulfate is added to remove the Cl₂ residual before the supernatant is discharged to the river.



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Site (Name): MOE DWS Mapping
Type: DWS Mapping Point

Sub Type:



INSPECTION SUMMARY:

Introduction

- The primary focus of this inspection is to confirm compliance with Ministry of the Environment and Climate Change (MOECC) legislation as well as evaluating conformance with ministry drinking water related policies and guidelines during the inspection period. The ministry utilizes a comprehensive, multi-barrier approach in the inspection of water systems that focuses on the source, treatment and distribution components as well as management practices.

This drinking water system is subject to the legislative requirements of the Safe Drinking Water Act, 2002 (SDWA) and regulations made therein, including Ontario Regulation 170/03, "Drinking Water Systems" (O.Reg. 170/03). This inspection has been conducted pursuant to Section 81 of the SDWA.

This report is based on a "focused" inspection of the system. Although the inspection involved fewer activities than those normally undertaken in a detailed inspection, it contained critical elements required to assess key compliance issues. This system was chosen for a focused inspection because the system's performance met the ministry's criteria, most importantly that there were no deficiencies as identified in O.Reg. 172/03 over the past 3 years. The undertaking of a focused inspection at this drinking water system does not ensure that a similar type of inspection will be conducted at any point in the future.

This inspection report does not suggest that all applicable legislation and regulations were evaluated. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

An announced inspection of the Brockville Drinking Water System was conducted on June 27, 2017, under the authority of Section 81 of the Safe Drinking Water Act, by Suzanne Smith, Provincial Officer/Inspector Badge # 1511, herein also referred to as the "Water Inspector".

The Brockville Drinking Water System, is owned by the Corporation of the City of Brockville, and consists of the Brockville Treatment Plant (WTP), the Brockville Distribution System and the Brockville Trunk Distribution System. A distribution system serving the southerly portion of the Township of Elizabethtown-Kitley, and owned by the Township of Elizabethtown-Kitley is also supplied drinking water from the Brockville DWS; however, compliance assessment of this system is not within the scope of this inspection report.

The Brockville DWS is operated by the Water Systems Division of City of Brockville Environmental Services Department, herein also referred to as the "Water Systems Division", "WSD-ESD" or the "operating authority".

The DWS is operated under Drinking Water Works Permit Number (DWWP #) 152-201, Issue Number 2, issued June 27, 2016; and, Municipal Drinking Water Licence Number (MDWL #) 152-101, Issue Number 4, issued June 27, 2016.

The Water Inspector was accompanied and assisted during the inspection by Jason Barlow, Chief Operator Water Systems employed with the WSD-ESD.

The scope of the inspection included a physical inspection of the Brockville WTP, a subset of outstations, and, document review for the period June 27, 2016 up to and including June 27, 2016.

Capacity Assessment

- There was sufficient monitoring of flow as required by the Municipal Drinking Water Licence or Drinking



Capacity Assessment

Water Works Permit issued under Part V of the SDWA.

Flow measuring and recording requirements are prescribed in Section 2.0 "Flow Measurement and Recording Requirements" of Schedule C to MDWL # 152-101.

Flow measuring devices (venturi/differential pressure type) are installed in the raw water transmission line, on each filter effluent line and on the backwash water line, and two magnetic flow meters (Krohne) are installed on the high lift pump (HLP) discharge headers to measure the rate and daily volume of raw water entering the treatment system and the rate and daily volume of treated water conveyed from the treatment system to the distribution system.

The flow measurement data is continuously transmitted to and recorded by the WTP SCADA system.

- **The owner was in compliance with the conditions associated with maximum flow rate or the rated capacity conditions in the Municipal Drinking Water Licence issued under Part V of the SDWA.**

"System Performance" of Schedule C to MDWL # 152-101, issue number 4. According to Table 1, Rated Capacity, the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed the value as the rated capacity of 36,400 cubic metres per day (m³/d).

The reported maximum daily volume flowing from the WTP to the distribution system, during the inspection period, was 13, 895 m³/d. This maximum flow rate occurred in August 2016.

Treatment Processes

- **The owner had ensured that all equipment was installed in accordance with Schedule A and Schedule C of the Drinking Water Works Permit.**

The Inspector conducted a supervised tour of the Brockville WTP, and the system outstations, with Jason Barlow, to assess compliance with the equipment described in Schedule A and Schedule C in DWWP # 152-101, issue number 4.

The Inspector found that the equipment installed within the Brockville WTP and the outstations matched the description of the equipment in the DWWP.

- **The owner/operating authority was in compliance with the requirement to prepare Form 1 documents as required by their Drinking Water Works Permit during the inspection period.**

Completed copies of Form 1 (Record of Watermains Authorized as a Future Alteration) documents are stored electronically on the City of Brockville's computer network. Hardcopies of the completed Form 1 documents are also maintained by the City of Brockville, and, copies were provided to the water inspector during the inspection.

- **The owner/operating authority was in compliance with the requirement to prepare Form 2 documents as required by their Drinking Water Works Permit during the inspection period.**

Minor Modifications or Replacements to the Drinking Water System requirement to prepare Form 2 documents were complied with as evidenced by the forms provided to the water inspector during the inspection.

- **Records indicated that the treatment equipment was operated in a manner that achieved the design capabilities required under Ontario Regulation 170/03 or a Drinking Water Works Permit and/or Municipal Drinking Water Licence issued under Part V of the SDWA at all times that water was being supplied to consumers.**

The Brockville WTP is a direct filtration process and includes treatment processes consisting of coagulation-flocculation, filtration, primary disinfection and secondary disinfection. Primary disinfection is accomplished using free chlorination and ultraviolet (UV) light. Under normal circumstances, free chlorination is used, however, if



Treatment Processes

operating conditions (flow, temperature, and pH) approach the limit of WTP's capability to provide primary disinfection by free chlorination only, a combination of UV light and free chlorination is used. Secondary disinfection is provided by free chlorination. The treatment equipment is capable of achieving an overall performance that provides at a minimum 2-log (99%) removal or inactivation of Cryptosporidium oocysts, a 3-log (99.9%) removal or inactivation of Giardia cysts, and a 4-log (99.99%) removal or inactivation of viruses, before the water is delivered to the first consumer.

The Inspector reviewed process control and plant performance logs and SCADA trending for the drinking water system for the inspection period and verified that the treatment equipment was operated in a manner that achieved the design capabilities required under Ontario Regulation 170/03 or a Permit, Licence or Approval issued under Part V of the SDWA at all times that water was being supplied to consumers.

- **Records confirmed that the water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined.**
- **The primary disinfection equipment was equipped with alarms or shut-off mechanisms that satisfied the standards described in Section 1-6 (1) of Schedule 1 of Ontario Regulation 170/03**

The requirements for primary disinfection equipment not using chlorination or chloramination to have alarms or mechanisms to ensure that no water is directed to users of water treated by the equipment in the event that the equipment malfunctions, loses power or ceases to provide the appropriate level of disinfection are prescribed in subsection 1-6 (1) of Schedule 1 to O. Reg. 170/03.

The UV system may be used as a backup for disinfection with chlorination, or continuously as a multi-barrier disinfection system. The UV system is equipped with two (one duty and one standby) UV disinfection units. The UV reactors are continuously monitored, when in operation, for UV intensity, calculated UV dose, flow rate and lamp status; and the system is equipped with alarms that will alert operators at the water treatment plant, and/or remotely should a UV reactor fail or malfunction.

Treatment Process Monitoring

- **Primary disinfection chlorine monitoring was conducted at a location approved by Municipal Drinking Water Licence and/or Drinking Water Works Permit issued under Part V of the SDWA, or at/near a location where the intended CT has just been achieved.**

Primary disinfection chlorine monitoring is performed using continuous analyzers (HACH CL17) to monitor pre-chlorination (pre-filtration), at the clearwell (post-filtration), at the exit of the reservoir and in the treated water (post UV disinfection as the water enters the distribution system). Log inactivation values are calculated from these free chlorine residual values, and the residence time in each segment. Most of the required disinfection is achieved in the clearwell and reservoir.

Section 1.0 – System Description of DWWP # 152-201, identifies that the UV disinfection system is used as a backup for disinfection with chlorination, and the system is to provide a minimum UV dosage of 20 MilliJoules per square centimetre (mJ/cm^2) at a design flow rate of 36,400 m^3/day .

- **Continuous monitoring of each filter effluent line was being performed for turbidity.**

Each filter effluent line is equipped with a continuous water quality analyzer (HACH 1720E Low Range Turbidimeter) to continuously measure filter effluent turbidity, and monitor filter performance. The turbidity results from the two (2) turbidimeters are transmitted to, trended and stored by the WTP SCADA system.

- **The secondary disinfectant residual was measured as required for the distribution system.**



Treatment Process Monitoring

A continuous water quality analyzer (HACH CL17) is installed to sample and test from the Zone 2 discharge header at the Parkdale Avenue Reservoir, Pumping Station and Re-chlorination Facility, for the purpose of evaluating free chlorine entering the distribution system from Zone 1 and following re-chlorination (if required). The test results from this analyzer are transmitted to the Brockville WTP's SCADA system and recorded.

- **Operators were examining continuous monitoring test results and they were examining the results within 72 hours of the test.**

A "Brockville Water Treatment Plant Daily Lab Report" is produced each day by the SCADA system, and reviewed by the operator the next morning between 0700 hours and 0800 hours. Included with the daily reports are SCADA generated trending graphs for operator review and analysis.

- **All continuous monitoring equipment utilized for sampling and testing required by O. Reg.170/03, or Municipal Drinking Water Licence or Drinking Water Works Permit or order, were equipped with alarms or shut-off mechanisms that satisfy the standards described in Schedule 6.**

Details concerning filter effluent turbidity, primary disinfection and secondary disinfection and fluoridation critical control limit alarms and response requirements are provided in: the Brockville Drinking Water System DWQMS Procedure 1004 "Risk Assessment – Outcome Summary", contained in Appendix D of the Operational Plan for the system; SOP 201 Adverse Drinking Water Quality Results or Exceedance of Standards; Water System Emergency Plan (WSEP) 008 Chemical Feed Failure; WSEP 009 Filter Failure; SOP 808 CT Requirements Normal Operating Conditions; SOP 809 CT Requirements Adverse Operating Conditions; WSEP 003 Chlorine System Failure; WSEP 016 Fluoride Over-dosage; and from the process alarm settings available from the SCADA system.

According to information contained within the sources identified above, the Brockville DWS continuous monitoring equipment is equipped with appropriate alarms.

- **Continuous monitoring equipment that was being utilized to fulfill O. Reg. 170/03 requirements was performing tests for the parameters with at least the minimum frequency specified in the Table in Schedule 6 of O. Reg. 170/03 and recording data with the prescribed format.**

The free chlorine residual analysers within the Brockville WTP, and the Parkdale Avenue Reservoir, Pumping Station and Re-chlorination Facility, sample and test every 2.5 minutes, and the results are transmitted to the SCADA system immediately.

All continuous analysers measuring turbidity (raw, filter effluent and treated water) sample and test instantaneously (milliseconds), and transmit results to the SCADA system at 30 second intervals.

The continuous water quality analyser measuring treated water fluoride concentration tests once every 5 minutes, and the results are transmitted to the SCADA system immediately.

- **All continuous analysers were calibrated, maintained, and operated, in accordance with the manufacturer's instructions or the regulation.**

The Inspector examined the completed monthly calibration forms (included in the "Brockville Water Systems Monthly Reports") and the operational logbooks, and verified information concerning the calibration, maintenance and operation of continuous analysers was recorded.

Operations Manuals

- **The operations and maintenance manuals contained plans, drawings and process descriptions sufficient for the safe and efficient operation of the system.**



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Operations Manuals

An examination of the Operational Plan (DWQMS Document Number: 152-401) and Operations Manual found that it contains a process narrative and process flow diagrams for the Brockville WTP and the distribution system sufficient for the safe and efficient operation of the system.

- **The operations and maintenance manuals met the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA.**

Logbooks

- **Records or other record keeping mechanisms confirmed that operational testing not performed by continuous monitoring equipment was being done by a certified operator, water quality analyst, or person who suffices the requirements of O. Reg. 170/03 7-5.**

A review of the Brockville Water Treatment Plant Daily Lab Reports and the Daily Log sheet Manual Entry reports used for recording the results of: operational tests; sample submission and chain of custody forms for samples submitted to the licensed laboratory used to provide drinking water testing services; and results of field testing for chlorine residual and pH, found that operational testing and other regulatory field testing was conducted by certified operators at the Brockville WTP, or certified operators assigned to sample and test the distribution system.

Security

- **The owner had provided security measures to protect components of the drinking water system.**

Certification and Training

- **The overall responsible operator had been designated for each subsystem.**

Section 11.1 of The City of Brockville Drinking Water System Operational Plan (DWQMS Document No. 152-401), identifies that Chief Operator, Water Systems is designated as the overall responsible operator (ORO) for the Brockville DWS, including the WTP, the local water distribution system and the trunk water distribution system. The Operational Plan also identifies that the Supervisor, Water Systems is designated as the ORO when the Chief Operator is absent. Should both the Chief Operator and the Supervisor be absent, a qualified, licensed operator (from the unionized workforce) is assigned responsibility of ORO in writing by email or internal memo.

Currently the Chief Operator position is held by Jason Barlow and the Supervisor position is held by Don Richards. Both Mr. Barlow and Mr. Richards hold valid and appropriate certification to serve as the ORO for the Brockville DWS.

- **Operators in charge had been designated for all subsystems which comprised the drinking-water system.**

Section 9 of The City of Brockville Drinking Water System Operational Plan (DWQMS Document No. 152-401), identifies / designates a number of positions (Operator, Water Systems, Operator/Instrumentation Technician, Water Systems and Maintenance Technician, Water Systems), as operators in charge (OIC) for the Brockville DWS.

- **All operators possessed the required certification.**

- **Only certified operators made adjustments to the treatment equipment.**

The Inspector reviewed the facility logbooks for the inspection period, and found that only certified operators made changes to the treatment processes and adjustments to the treatment equipment.

Water Quality Monitoring



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- **All microbiological water quality monitoring requirements for distribution samples were being met.**

The City of Brockville DWS supplies drinking water to the Brockville Water Distribution System, serving a population of 22,000 and the Elizabethtown-Kitley Water Distribution System (to the west and the east of Brockville), serving a population of 350. The City of Brockville and Township of Elizabethtown-Kitley have an agreement in place in accordance with subsection 5(4) of O. Reg. 170/03, allowing the City of Brockville to treat the Elizabethtown-Kitley Water Distribution System as part of the Brockville Water Distribution for the purpose of sampling and testing.

In the case of the total reported serviced population of 22,350, at least 30 distribution samples, must be taken each month, with at least one of the samples being taken each week and tested for E. coli and total coliforms, and at least 25% of all samples taken in each week tested for general bacteria population expressed as heterotrophic plate count (HPC).

The Inspector reviewed microbiological sampling and testing records available for the inspection period and confirmed that legislative requirements were met.

- **All microbiological water quality monitoring requirements for treated samples were being met.**

The Inspector reviewed microbiological sampling and testing records available for the inspection period, and found that one (1) treated water sample was taken during each week, and submitted to a licensed laboratory for testing for E. coli, total coliforms and HPC.

- **All inorganic water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

The Inspector reviewed sampling and testing records for the inspection period, and observed that water samples were last taken from the point where the water from the Brockville WTP enters the distribution system on January 3, 2016, and submitted for testing for the inorganic parameters listed in Schedule 23 to O. Reg. 170/03.

A review of the inorganic test results found that the drinking water met the ODWQS for all inorganic parameters.

- **All organic water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**

The Inspector reviewed sampling and testing records for the inspection period, and observed that water samples were last taken from the point where the water from the Brockville WTP enters the distribution system on January 3, 2017, and submitted for testing for the organic parameters listed in Schedule 24 to O. Reg. 170/03.

- **All haloacetic acid water quality monitoring requirements prescribed by legislation are being conducted within the required frequency and at the required location.**

The Inspector reviewed sampling and testing records for the inspection period and observed that water samples were taken once every three (3) months from a location within the Brockville WTP where the water enters the distribution system, and submitted to a licensed laboratory for haloacetic acid testing.

- **All trihalomethane water quality monitoring requirements prescribed by legislation were conducted within the required frequency and at the required location.**

The Inspector reviewed sampling and testing records for the inspection period and found that distribution samples were taken on July 5, October 4 , 2016, and January 3, and April 4, 2017 from the Parkedale Avenue Reservoir (a location within the Brockville Distribution System considered to have an elevated potential for the formation of trihalomethanes), and submitted to a licensed laboratory for trihalomethane (THM) testing.

- **All nitrate/nitrite water quality monitoring requirements prescribed by legislation were conducted within the required frequency for the DWS.**

The Inspector reviewed sampling and testing records for the inspection period and observed that water samples



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were taken once every three (3) months from a location within the Brockville WTP where the water enters the distribution system, and submitted to a licensed laboratory for nitrate and nitrite testing.

- **All sodium water quality monitoring requirements prescribed by legislation were conducted within the required frequency.**
- **The required daily samples were being taken at the end of the fluoridation process.**
Fluoride concentration is continuously monitored using a HACH CA610 brand & model continuous fluoride analyser
- **All water quality monitoring requirements imposed by the Municipal Drinking Water Licence and Drinking Water Works Permit were being met.**
Schedule C to MDWL # 152-101 prescribes monthly sampling and testing requirements for TSS for the waste residual management system effluent from the Brockville WTP, including the collection of manual composite samples from the point of discharge. A review of sampling and testing data for the waste residual management system effluent found that monthly manual composite samples are collected from the outfall to the St. Lawrence River, and submitted to a licensed laboratory for testing for TSS.

Verification through logbook entries and analytical results reviewed show compliance with this requirement of water quality monitoring requirements imposed by the Municipal Drinking Water Licence.

- **Records confirmed that chlorine residual tests were being conducted at the same time and at the same location that microbiological samples were obtained.**

The Inspector observed that free chlorine residual test results, for samples of treated water taken at the same time and location where microbiological samples were obtained, were recorded on laboratory sample submission and chain of custody forms.

The chlorine residual test results were also transposed to the certificates / reports of analysis for the microbiological samples.

Water Quality Assessment

- **Records did not show that all water sample results taken during the inspection review period did not exceed the values of tables 1, 2 and 3 of the Ontario Drinking Water Quality Standards (O.Reg. 169/03).**
Records show that water sample results taken during the review period met the Ontario Drinking Water Quality Standards (O. Reg. 169/03), with the following exceptions:

Adverse Drinking Water Incident Number (AWQI #) 131136:

A distribution sample (Brockville Museum) taken on September 6, 2015, had, total coliforms detected in a density of 1 cfu/100 mL. The operating authority resampled September 7, 2016 and submitted the samples to a licensed laboratory for testing. The resample results indicated the drinking water supplied at the time of resampling met the Ontario Drinking Water Quality Standards for microbiological parameters.

AWQI # 131160:

The fluoride exceedance during the main plant power failure was 2.0 mg/L. The fluoride chemical feed system was shut down at 21:49 hrs. The fluoride residual main plant discharge at 22:11 hrs was 1.44 mg/L and 0.96 mg/L at 22:17 hrs. Feedermain Hydrant #815 was flushed. At 22:30 hrs, the fluoride decreased to 0.98 mg/L and at 22:40 hrs, it was further decreased by 0.76 mg/L. All required paperwork has been received.

AWQI # 131162:



Water Quality Assessment

Major power outage resulting in a fluoride exceedence and believed the programming was out of calibration. Fluoride exceedance occurred during chemical feed system startup at 14:18 hrs. System was shutdown in order to resolve issue. At 14:55, the fluoride was at 1.41 mg/L and 0.61 mg/L at 15:07 hrs. Flushed feedmain hydrant #815. At 15:20 hrs, the fluoride was 1.47 mg/L and at 16:05 hrs, the fluoride was 0.43 mg/L. All required paperwork has been received and attached.

Reporting & Corrective Actions

- **Corrective actions (as per Schedule 17) had been taken to address adverse conditions, including any other steps that were directed by the Medical Officer of Health.**

The corrective actions taken to address the AWQIs previously described, included resampling and testing for microbiological or chemical parameters or, flushing the affected area of the distribution system followed by resampling and testing for microbiological or chemical parameters.

The Medical Officer of Health for the Leeds, Grenville and Lanark District Health Unit did not direct additional corrective actions to be taken concerning the incidents described above.

- **All required notifications of adverse water quality incidents were immediately provided as per O. Reg. 170/03 16-6.**

A review of the AWQI reporting history for the aforementioned incidents indicates that the DWS operating authority made all the required verbal notifications of adverse water quality incidents immediately provided as per O. Reg. 170/03 16-6.

- **Where required continuous monitoring equipment used for the monitoring of chlorine residual and/or turbidity triggered an alarm or an automatic shut-off, a qualified person responded in a timely manner and took appropriate actions.**

The Inspector examined the facility logbook for the Brockville WTP in detail for the inspection period, and found that log entries indicated that alarms were responded to in an appropriate manner.

- **When the primary disinfection equipment, other than that used for chlorination or chloramination, has failed causing an alarm to sound or an automatic shut-off to occur, a certified operator responded in a timely manner and took appropriate actions.**

The UV reactors are only used when required to meet the primary disinfection requirements.

The Inspector examined the facility logbook for the Brockville WTP in detail for the inspection period, and found that log entries indicated that alarms were responded to in an appropriate manner.



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NON-COMPLIANCE WITH REGULATORY REQUIREMENTS AND ACTIONS REQUIRED

This section provides a summary of all non-compliance with regulatory requirements identified during the inspection period, as well as actions required to address these issues. Further details pertaining to these items can be found in the body of the inspection report.

Not Applicable



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SUMMARY OF RECOMMENDATIONS AND BEST PRACTICE ISSUES

This section provides a summary of all recommendations and best practice issues identified during the inspection period. Details pertaining to these items can be found in the body of the inspection report. In the interest of continuous improvement in the interim, it is recommended that owners and operators develop an awareness of the following issues and consider measures to address them.

Not Applicable



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SIGNATURES

Inspected By:

Suzanne Smith

Signature: (Provincial Officer)

A handwritten signature in black ink that appears to read "S. Smith".

Reviewed & Approved By:

James Mahoney

Signature: (Supervisor)

A handwritten signature in black ink that appears to read "J. Mahoney".

Review & Approval Date: 19/10/2017

Note: This inspection does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they apply or may apply to this facility. It is, and remains, the responsibility of the owner and/or operating authority to ensure compliance with all applicable legislative and regulatory requirements.



**Ministry of the Environment and Climate Change
Drinking Water System Inspection Report**

APPENDIX A

**MUNICIPAL DRINKING WATER LICENCE, DRINKING WATER
WORKS PERMIT AND CERTIFICATES OF APPROVAL**



MUNICIPAL DRINKING WATER LICENCE

**Licence Number: 152-101
Issue Number: 4**

Pursuant to the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32, and the regulations made thereunder and subject to the limitations thereof, this municipal drinking water licence is issued under Part V of the *Safe Drinking Water Act, 2002*, S.O. 2002, c. 32 to:

The Corporation of the City of Brockville

**1 King St. W.,
P.O. Box 5000, Brockville K6V 7A5 ON**

For the following municipal residential drinking water system:

Brockville Drinking Water System

This municipal drinking water licence includes the following:

Schedule	Description
Schedule A	Drinking Water System Information
Schedule B	General Conditions
Schedule C	System-Specific Conditions
Schedule D	Conditions for Relief from Regulatory Requirements
Schedule E	Pathogen Log Removal/Inactivation Credits

DATED at TORONTO this 27th day of June, 2016

Signature

Aziz Ahmed, P.Eng.
Director
Part V, *Safe Drinking Water Act, 2002*

Schedule A: Drinking Water System Information

System Owner	The Corporation of the City of Brockville
Licence Number	152-101
Drinking Water System Name	Brockville Drinking Water System
Schedule A Issue Date	June 27th, 2016

The following information is applicable to the above drinking water system and forms part of this licence:

Licence

Licence Issue Date	June 27th, 2016
Licence Expiry Date	June 26th, 2021
Application for Licence Renewal Date	December 26th, 2020

Drinking Water Works Permit

Drinking Water System Name	Permit Number	Issue Date
Brockville Drinking Water System	152-201	June 27th, 2016

Permits to Take Water

Water Taking Location	Permit Number	Issue Date
St. Lawrence River	2346-9H7NEF	March 18, 2014

Financial Plans

The Financial Plan Number for the Financial Plan required to be developed for this drinking water system in accordance with O. Reg. 453/07 shall be:	152-301
Alternately, if one Financial Plan is developed for all drinking water systems owned by the owner, the Financial Plan Number shall be:	152-301A

Accredited Operating Authority

Drinking Water System or Operational Subsystems	Accredited Operating Authority	Operational Plan No.	Operating Authority No.
Brockville Drinking Water System	City of Brockville	152-401	152-OA1

Schedule B: General Conditions

System Owner	The Corporation of the City of Brockville
Licence Number	152-101
Drinking Water System Name	Brockville Drinking Water System
Schedule B Issue Date	June 27th, 2016

1.0 Definitions

1.1 Words and phrases not defined in this licence and the associated drinking water works permit shall be given the same meaning as those set out in the SDWA and any regulations made in accordance with that act, unless the context requires otherwise.

1.2 In this licence and the associated drinking water works permit:

"adverse effect", **"contaminant"** and **"natural environment"** shall have the same meanings as in the EPA;

"alteration" may include the following in respect of this drinking water system:

- (a) An addition to the system,
- (b) A modification of the system,
- (c) A replacement of part of the system, and
- (d) An extension of the system;

"compound of concern" means a contaminant that, based on generally available information, may be emitted from a component of the drinking water system to the atmosphere in a quantity that is significant either in comparison to the relevant point of impingement limit or if a point of impingement limit is not available for the compound, then based on generally available toxicological information, the compound has the potential to cause an adverse effect as defined by the EPA at a point of impingement;

"Director" means a Director appointed pursuant to section 6 of the SDWA for the purposes of Part V of the SDWA;

"drinking water works permit" means the drinking water works permit for the drinking water system, as identified in Schedule A of this licence and as amended from time to time;

"emission summary table" means the table that was prepared by a Professional Engineer in accordance with O. Reg. 419/05 and the procedure document listing the appropriate point of impingement concentrations of each compound of concern emitted from a component of the drinking water system and providing comparison to the corresponding point of impingement limit;

"EPA" means the *Environmental Protection Act*, R.S.O. 1990, c. E.19;

"financial plan" means the financial plan required by O. Reg. 453/07;

"licence" means this municipal drinking water licence for the municipal drinking water system identified in Schedule A of this licence;

"operational plan" means an operational plan developed in accordance with the Director's Directions – Minimum Requirements for Operational Plans made under the authority of subsection 15(1) of the SDWA;

"owner" means the owner of the drinking water system as identified in Schedule A of this licence;

"permit to take water" means the permit to take water that is associated with the taking of water for purposes of the operation of the drinking water system, as identified in Schedule A of this licence and as amended from time to time;

"point of impingement" means any point in the natural environment that is not on the same property as the source of the contaminant and as defined by section 2 of O. Reg. 419/05;

"point of impingement limit" means the appropriate standard from Schedule 1, 2 or 3 of O. Reg. 419/05 and if a standard is not provided for a compound of concern, the appropriate criteria listed in the Ministry of the Environment and Climate Change publication titled "Summary of Standards and Guidelines to support Ontario Regulation 419: Air Pollution – Local Air Quality (including Schedule 6 of O. Reg. 419 on Upper Risk Thresholds)", dated February 2008, as amended;

"procedure document" means the Ministry of the Environment and Climate Change procedure titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated July 2005, as amended;

"Professional Engineer" means a Professional Engineer who has been licenced to practice in the Province of Ontario;

"provincial officer" means a provincial officer appointed pursuant to section 8 of the SDWA;

"publication NPC-300" means the Ministry of the Environment and Climate Change publication titled "Environmental Noise Guideline: Stationary and Transportation Sources – Approval and Planning" dated August 2013, as amended;

"SDWA" means the *Safe Drinking Water Act*, 2002, S.O. 2002, c. 32;

"sensitive populations" means any one or a combination of the following locations where the health effects of nitrogen oxides emissions from emergency generators shall be considered using the point of impingement limit instead of the Ministry of the Environment and Climate Change screening level for emergency generators:

- (a) health care units (e.g., hospitals and nursing homes),
- (b) primary/junior public schools,
- (c) day-care facilities, and
- (d) playgrounds;

"subsystem" has the same meaning as in Ontario Regulation 128/04 (Certification of Drinking Water System Operators and Water Quality Analysts);

"surface water" means water bodies (lakes, wetlands, ponds - including dug-outs), water courses (rivers, streams, water-filled drainage ditches), infiltration trenches, and areas of seasonal wetlands;

2.0 Applicability

- 2.1** In addition to any other requirements, the drinking water system identified above shall be established, altered and operated in accordance with the conditions of the drinking water works permit and this licence.

3.0 Licence Expiry

- 3.1** This licence expires on the date identified as the licence expiry date in Schedule A of this licence.

4.0 Licence Renewal

- 4.1** Any application to renew this licence shall be made on or before the date identified as the application for licence renewal date set out in Schedule A of this licence.

5.0 Compliance

- 5.1** The owner and operating authority shall ensure that any person authorized to carry out work on or to operate any aspect of the drinking water system has been informed of the SDWA, all applicable regulations made in accordance with that act, the drinking water works permit and this licence and shall take all reasonable measures to ensure any such person complies with the same.

6.0 Licence and Drinking Water Works Permit Availability

- 6.1** At least one copy of this licence and the drinking water works permit shall be stored in such a manner that they are readily viewable by all persons involved in the operation of the drinking water system.

7.0 Permit to Take Water and Drinking Water Works Permit

- 7.1 A permit to take water identified in Schedule A of this licence is the applicable permit on the date identified as the Schedule A Issue Date.
- 7.2 A drinking water works permit identified in Schedule A of this licence is the applicable permit on the date identified as the Schedule A Issue Date.

8.0 Financial Plan

- 8.1 For every financial plan prepared in accordance with subsections 2(1) and 3(1) of O. Reg. 453/07, the owner of the drinking water system shall:
 - 8.1.1 Ensure that the financial plan contains on the front page of the financial plan, the appropriate financial plan number as set out in Schedule A of this licence; and
 - 8.1.2 Submit a copy of the financial plan to the Ministry of Municipal Affairs and Housing within three (3) months of receiving approval by a resolution of municipal council or the governing body of the owner.

9.0 Interpretation

- 9.1 Where there is a conflict between the provisions of this licence and any other document, the following hierarchy shall be used to determine the provision that takes precedence:
 - 9.1.1 The SDWA;
 - 9.1.2 A condition imposed in this licence that explicitly overrides a prescribed regulatory requirement;
 - 9.1.3 A condition imposed in the drinking water works permit that explicitly overrides a prescribed regulatory requirement;
 - 9.1.4 Any regulation made under the SDWA;
 - 9.1.5 Any provision of this licence that does not explicitly override a prescribed regulatory requirement;
 - 9.1.6 Any provision of the drinking water works permit that does not explicitly override a prescribed regulatory requirement;
 - 9.1.7 Any application documents listed in this licence, or the drinking water works permit from the most recent to the earliest; and
 - 9.1.8 All other documents listed in this licence, or the drinking water works permit from the most recent to the earliest.
- 9.2 If any requirement of this licence or the drinking water works permit is found to be invalid by a court of competent jurisdiction, the remaining requirements of this licence and the drinking water works permit shall continue to apply.

- 9.3** The issuance of and compliance with the conditions of this licence and the drinking water works permit does not:
- 9.3.1** Relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including the *Environmental Assessment Act*, R.S.O. 1990, c. E.18; and
 - 9.3.2** Limit in any way the authority of the appointed Directors and provincial officers of the Ministry of the Environment and Climate Change to require certain steps be taken or to require the owner to furnish any further information related to compliance with the conditions of this licence or the drinking water works permit.
- 9.4** For greater certainty, nothing in this licence or the drinking water works permit shall be read to provide relief from regulatory requirements in accordance with section 46 of the SDWA, except as expressly provided in the licence or the drinking water works permit.

10.0 Adverse Effects

- 10.1** Nothing in this licence or the drinking water works permit shall be read as to permit:
 - 10.1.1** The discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect; or
 - 10.1.2** The discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters.
- 10.2** All reasonable steps shall be taken to minimize and ameliorate any adverse effect on the natural environment or impairment of the quality of water of any waters resulting from the operation of the drinking water system including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.
- 10.3** Fulfillment of one or more conditions imposed by this licence or the drinking water works permit does not eliminate the requirement to fulfill any other condition of this licence or the drinking water works permit.

11.0 Change of Owner or Operating Authority

- 11.1** This licence is not transferable without the prior written consent of the Director.
- 11.2** The owner shall notify the Director in writing at least 30 days prior to a change of any operating authority identified in Schedule A of this licence.
 - 11.2.1** Where the change of operating authority is the result of an emergency situation, the owner shall notify the Director in writing of the change as soon as practicable.

12.0 Information to be Provided

- 12.1** Any information requested by a Director or a provincial officer concerning the drinking water system and its operation, including but not limited to any records required to be kept by this licence or the drinking water works permit, shall be provided upon request.

13.0 Records Retention

- 13.1** Except as otherwise required in this licence or the drinking water works permit, any records required by or created in accordance with this licence or the drinking water works permit, other than the records specifically referenced in section 12 of O. Reg. 170/03, shall be retained for at least 5 years and made available for inspection by a provincial officer, upon request.

14.0 Chemicals and Materials

- 14.1** All chemicals and materials used in the alteration or operation of the drinking water system that come into contact with water within the system shall meet all applicable standards set by both the American Water Works Association ("AWWA") and the American National Standards Institute ("ANSI") safety criteria standards NSF/60, NSF/61 and NSF/372.

14.1.1 In the event that the standards are updated, the owner may request authorization from the Director to use any on hand chemicals and materials that previously met the applicable standards.

14.1.2 The requirement for the owner to comply with NSF/372 shall come into force no later than June 27th, 2018.

- 14.2** The most current chemical and material product registration documentation from a testing institution accredited by either the Standards Council of Canada or by the American National Standards Institution ("ANSI") shall be available at all times for each chemical and material used in the operation of the drinking water system that comes into contact with water within the system.

14.3 Conditions 14.1 and 14.2 do not apply in the case of the following:

14.3.1 Water pipe and pipe fittings meeting AWWA specifications made from ductile iron, cast iron, PVC, fibre and/or steel wire reinforced cement pipe or high density polyethylene (HDPE);

14.3.2 Articles made from stainless steel, glass, HDPE or Teflon®;

14.3.3 Cement mortar for watermain lining and for water contacting surfaces of concrete structures made from washed aggregates and Portland cement;

14.3.4 Gaskets that are made from NSF approved materials;

14.3.5 Food grade oils and lubricants, food grade anti-freeze, and other food grade chemicals and materials that are compatible for drinking water use; or

- 14.3.6** Any particular chemical or material where the owner has written documentation signed by the Director that indicates that the Ministry of the Environment and Climate Change is satisfied that the chemical or material is acceptable for use within the drinking water system and the chemical or material is only used as permitted by the documentation.

15.0 Drawings

- 15.1** All drawings and diagrams in the possession of the owner that show any treatment subsystem as constructed shall be retained by the owner unless the drawings and diagrams are replaced by a revised or updated version showing the subsystem as constructed subsequent to the alteration.
- 15.2** Any alteration to any treatment subsystem shall be incorporated into process flow diagrams, process and instrumentation diagrams, and record drawings and diagrams within one year of the substantial completion of the alteration.
- 15.3** Process flow diagrams and process and instrumentation diagrams for any treatment subsystem shall be kept in a place, or made available in such a manner, that they may be readily viewed by all persons responsible for all or part of the operation of the drinking water system.

16.0 Operations and Maintenance Manual

- 16.1** An up-to-date operations and maintenance manual or manuals shall be maintained and applicable parts of the manual or manuals shall be made available for reference by all persons responsible for all or part of the operation or maintenance of the drinking water system.
- 16.2** The operations and maintenance manual or manuals, shall include at a minimum:
- 16.2.1** The requirements of this licence and associated procedures;
 - 16.2.2** The requirements of the drinking water works permit for the drinking water system;
 - 16.2.3** A description of the processes used to achieve primary and secondary disinfection within the drinking water system, including where applicable:
 - a) A copy of the CT calculations that were used as the basis for primary disinfection under worst case operating conditions; and
 - b) The validated operating conditions for UV disinfection equipment, including a copy of the validation certificate;
 - 16.2.4** Procedures for monitoring and recording the in-process parameters necessary for the control of any treatment subsystem and for assessing the performance of the drinking water system;

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- 16.2.5 Procedures for the operation and maintenance of monitoring equipment;
- 16.2.6 Contingency plans and procedures for the provision of adequate equipment and material to deal with emergencies, upset conditions and equipment breakdown;
- 16.2.7 Procedures for dealing with complaints related to the drinking water system, including the recording of the nature of the complaint and any investigation and corrective action taken in respect of the complaint;
- 16.3** Procedures necessary for the operation and maintenance of any alterations to the drinking water system shall be incorporated into the operations and maintenance manual or manuals prior to those alterations coming into operation.
- 16.4** The requirement for the owner to comply with condition 16.2.3 shall come into force on December 27th, 2016.

Schedule C: System-Specific Conditions

System Owner	The Corporation of the City of Brockville
Licence Number	152-101
Drinking Water System Name	Brockville Drinking Water System
Schedule C Issue Date	June 27th, 2016

1.0 System Performance

Rated Capacity

- 1.1 For each treatment subsystem listed in column 1 of Table 1, the maximum daily volume of treated water that flows from the treatment subsystem to the distribution system shall not exceed the value identified as the rated capacity in column 2 of the same row.

Table 1: Rated Capacity

Column 1 Treatment Subsystem Name	Column 2 Rated Capacity (m ³ /day)
Brockville Water Treatment Plant	36,400

Maximum Flow Rates

- 1.2 For each treatment subsystem listed in column 1 of Table 2, the maximum flow rate of water that flows into a treatment subsystem component listed in column 2 shall not exceed the value listed in column 3 of the same row.

Table 2: Maximum Flow Rates

Column 1 Treatment Subsystem Name	Column 2 Treatment Subsystem Component	Column 3 Maximum Flow Rate (L/s)
Not Applicable	Not Applicable	Not Applicable

- 1.3 Despite conditions 1.1 and 1.2, a treatment subsystem may be operated temporarily at a maximum daily volume and/or a maximum flow rate above the values set out in column 2 of Table 1 and column 3 of Table 2 respectively for the purposes of fighting a large fire or for the maintenance of the drinking water system.
- 1.4 Condition 1.3 does not authorize the discharge into the distribution system of any water that does not meet all of the requirements of this licence and all other regulatory requirements, including compliance with the Ontario Drinking Water Quality Standards.

Residue Management

- 1.5** In respect of an effluent discharged into the natural environment from a treatment subsystem or treatment subsystem component listed in column 1 of Table 3:
- 1.5.1** The annual average concentration of a test parameter identified in column 2 shall not exceed the value in column 3 of the same row; and
 - 1.5.2** The maximum concentration of a test parameter identified in column 2 shall not exceed the value in column 4 of the same row.

Table 3: Residue Management

Column 1 Treatment Subsystem or Treatment Subsystem Component Name	Column 2 Test Parameter	Column 3 Annual Average Concentration (mg/L)	Column 4 Maximum Concentration (mg/L)
Brockville Water Treatment Plant	Total Suspended Solids	25	Not Applicable

UV Disinfection Equipment Performance

- 1.6** For each treatment subsystem or treatment subsystem component listed in column 1 of Table 4, and while directing water to the distribution system:
- 1.6.1** The UV disinfection equipment shall be operated such that a continuous pass-through UV dose is maintained throughout the life time of the UV lamp(s) that is at least the minimum continuous pass-through UV dose set out in column 2 of the same row at the maximum design flow rate for the equipment;
 - 1.6.2** In addition to any other sampling, analysis and recording that may be required, the ultraviolet light disinfection equipment shall test for the test parameters set out in column 4 of the same row at a testing frequency of once every five (5) minutes or less and record the test data at a recording frequency of once every four (4) hours or less;
 - 1.6.3** If there is a UV disinfection equipment alarm, the test parameters set out in column 4 of the same row shall be recorded at a recording frequency of once every five minutes or less until the alarm condition has been corrected;
 - 1.6.4** A monthly summary report shall be prepared at the end of each calendar month which sets out the time, date and duration of each UV equipment alarm, the volume of water treated during each alarm period and the actions taken by the operating authority to correct the alarm situation;

ATTACHMENT #5

**BROCKVILLE WATER POLLUTION CONTROL CENTRE
SEWAGE PLANT PERFORMANCE ASSESSMENT REPORT**

MUNICIPALITY: BROCKVILLE
PROJECT: BROCKVILLE
WORKS NUMBER: 120000122

DESCRIPTION: A Secondary Treatment Facility, complete with two anaerobic digesters, two centrifuges for sludge thickening and two RDT's for sludge co-thickening and utilizing Alum for phosphorus removal and UV for effluent disinfection

YEAR: 2017
WATER COURSE: ST. LAWRENCE RIVER
DESIGN CAPACITY: 21,800 x 1000m³/day
PEAK DESIGN CAPACITY: 62,500 X 1000m³/day

MONTH	FLOWS			BOD/CBOD			SUSPENDED SOLIDS			PHOSPHORUS			TOTAL AMMONIA NITROGEN		E. COLI		
	TOTAL FLOW 1000M ³	Avg DAY FLOW 1000M ³	MAX DAY FLOW 1000M ³	Avg Raw BOD (mg/L)	Avg Eff CBOD (mg/L)	Total Loading Eff CBOD (kg/day)	Avg Raw SS (mg/L)	Avg Eff SS (mg/L)	Total Loading Eff SS (kg/day)	Percent Removal	Avg Raw Phos. (mg/L)	Avg Eff Phos. (mg/L)	Total Loading Eff Phos. (kg/day)	Percent Removal	Avg Eff TAN (mg/L)	Total Loading Eff TAN (kg/day)	E. Coli (Org/100 mL) (GEO MEAN)
DEC 17	471.55	15.211	20.726	138.00	5.00	75.06	160.00	10.00	152.11	93.8	2.69	0.41	6.24	84.8	7.59	115.45	1
NOV 17	651.87	21.729	32.760	142.00	5.00	108.65	152.00	12.00	260.75	92.1	2.66	0.55	11.95	79.3	4.96	107.78	3
OCT 17	470.22	15.168	34.800	419.00	4.00	60.67	491.00	8.00	121.34	98.4	3.91	0.52	7.89	86.7	3.76	57.03	2
SEP 17	422.15	14.072	17.586	309.00	4.00	56.29	410.00	8.00	112.58	98.0	3.68	0.52	7.32	85.9	2.67	37.57	1
AUG 17	564.61	18.213	23.393	244.44	3.78	68.85	290.33	8.11	147.71	97.2	3.01	0.54	9.84	82.1	1.84	33.51	1
JUL 17	678.60	21.890	47.039	154.50	4.22	92.38	176.40	7.56	155.49	95.7	2.28	0.57	12.48	75.0	4.56	99.82	4
JUN 17	595.82	19.861	26.400	187.44	3.56	70.71	217.56	5.78	114.80	97.3	3.00	0.47	9.33	84.3	5.83	115.79	4
MAY 17	864.87	27.899	51.513	165.00	3.27	91.23	205.45	8.00	223.19	96.1	2.17	0.32	8.93	85.3	3.10	86.49	5
APR 17	798.39	26.613	47.588	289.71	3.50	93.15	344.43	7.88	209.71	97.7	2.89	0.44	11.71	84.8	2.20	58.55	2
MAR 17	610.09	19.680	29.577	189.90	3.44	67.70	214.60	6.11	120.24	97.2	2.43	0.32	6.30	86.8	6.29	123.79	1
FEB 17	524.05	18.716	34.169	172.14	4.25	79.54	194.43	4.88	91.33	97.5	2.46	0.37	6.92	85.0	5.78	108.18	1
JAN 17	575.46	18.563	28.792	201.50	5.80	98.38	179.20	7.27	134.95	95.9	2.52	0.31	5.75	87.7	4.48	83.16	2
AVG		19.801		217.72	4.11	80.30	253.03	7.80	154.52	96.41	2.81	0.45	8.72	83.96	4.42	85.59	2
MAX				51.513	419.00	5.30	108.65	491.00	12.00	260.75	98.37	3.91	0.57	12.48	7.59	123.79	
Objective Limit						15.00			15.00				0.80				
Compliance Limit			21.800			25.00	545.00		25.00	545.00			1.00	21.80	18.0 (Nov. 1 to Apr. 30) 16.0 (May 1 to Oct. 31)	392 (Nov. 1 to Apr. 30) 349 (May 1 to Oct. 31)	200

MONTH	TOTAL LOADINGS			COMMENTS:
	TOTAL RAW BOD (kg/day)	TOTAL RAW SS (kg/day)	TOTAL RAW PHOS. (kg/day)	
DEC 17	2,099	2,434	41	
NOV 17	3,086	3,303	58	
OCT 17	6,355	7,447	59	
SEP 17	4,348	5,770	52	
AUG 17	4,452	5,288	55	
JUL 17	3,382	3,861	50	
JUN 17	3,723	4,321	60	
MAY 17	4,608	5,760	61	
APR 17	7,710	9,166	77	
MAR 17	3,737	4,223	48	
FEB 17	3,222	3,639	46	
JAN 17	3,740	3,326	47	
AVG	4,205	4,878	54	
MAX	7,710	9,166	77	