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TO:	**CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON MARCH 18, 2013**
FROM:	**JOHN LUCAS, P.ENG. DIRECTOR – WATER & WASTEWATER**
SUBJECT:	**CITY OF LONDON 2012 DRINKING WATER ANNUAL REPORT AND SUMMARY REPORT**

RECOMMENDATION

That, on the recommendation of the Director, Water & Wastewater, the 2012 Drinking Water Annual Report and Summary Report for the City of London Distribution System **BE RECEIVED** for information by Municipal Council.

PREVIOUS REPORTS PERTINENT TO THIS MATTER

- Annual Ministry of Environment Inspection of the City of London Water Distribution System - 2012", presented to CWC on February 4, 2013, Agenda Item #2;
- "City of London Water Supply and Distribution System 2011 Compliance Report" presented to CWC on March 5, 2011. Agenda Item #8;
- "City of London Water Supply and Distribution System 2010 Compliance Report" presented to BNEC on March 28, 2011. Agenda Item #18;

BACKGROUND

O. Reg. 170/03 (Drinking Water Systems) requires the owner of a municipal drinking water system to ensure that an Annual Report and a Summary Report be prepared, covering the period of January 1 through to December 31 of the previous year.

The Annual Report is to contain:

- A brief description of the drinking water system, including a list of water treatment chemicals used by the system;
- A summary of the results of required tests;
- A summary of any adverse test results reported and corrective actions taken; and
- A description of any major expenses incurred to install, repair or replace required equipment.

O. Reg. 170/03 further stipulates that:

a) The Owner shall ensure that a copy of the Annual Report is given without charge to every person who requests a copy;
b) Effective steps are taken to advise users of water from the system that copies of the Annual Report are available, without charge, and of how a copy may be obtained;
c) The Owner of a large municipal residential system serving more than 10,000 people is required to post a copy of the Annual Report to the municipality's web site; and,
d) A Summary Report is to be prepared and presented to the members of the Municipal Council by no later than March 31 of the following year.

The Summary Report is to contain:

- A list of any regulatory requirements applicable to the system that were not met at any time during the period covered by the report, the duration of the failure, and the measures that were taken to correct the failure; and,
- A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows and compared to the rated capacity of the system.

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Due to the large number of pages, the 2012 Drinking Water Summary Report for the City of London Distribution System has been provided to members of Council in electronic format, with the 2012 Annual Report attached as an appendix. The Summary Report (without appendices) is attached as Appendix 'A' to this report.

SUMMARY

Receipt of Appendix 'A' of this report by members of Council fulfils the reporting requirements of O. Reg. 170/03, Schedule 22. The 2012 Drinking Water Summary Report is available to members of the public through the Water and Engineering Review Division (8th Floor, City Hall), and will be posted on the City's web site.

Acknowledgements:

This report has been prepared with input from Scott Koshowski, P. Eng. - Environmental Services Engineer, and Dan Huggins - Water Quality Manager, both in Water Operations Division.

PREPARED BY:	**RECOMMENDED BY:**
JOHN SIMON, P.ENG. **DIVISION MANAGER, WATER OPERATIONS**	**JOHN LUCAS, P.ENG.** **DIRECTOR – WATER & WASTEWATER**
CONCURRED BY:	
JOHN BRAAM, P.ENG. **MANAGING DIRECTOR – ENVIRONMENTAL & ENGINEERING SERVICES & CITY ENGINEER**	

c.c. Cathy Saunders - City Clerk
Roland Welker - Division Manager – Water Engineering
Andrew Henry - Division Manager – Regional Water Supply
Dan Huggins - Water Quality Manager
Dr. Bryna Warshawsky - Associate Medical Officer of Health – Middlesex-London Health Unit

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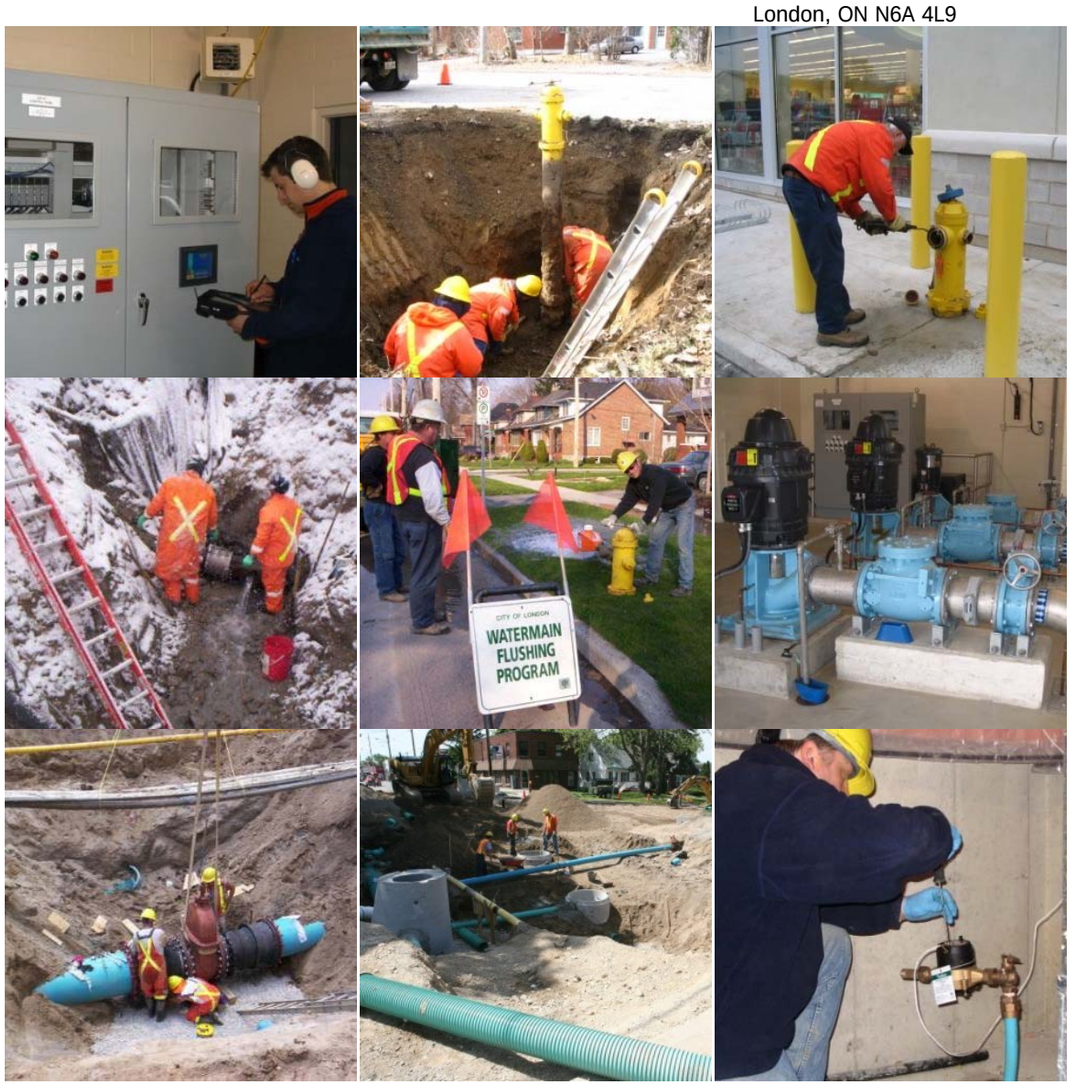
2012 DRINKING WATER SUMMARY REPORT

CITY OF LONDON
2012 DRINKING WATER SUMMARY REPORT

System Name: City of London Distribution System

Mailing Address: Corporation of the City of London
P.O. Box 5035, 300 Dufferin Ave.
London, ON N6A 4L9



System Rating: Water Distribution Subsystem Class IV
Water Treatment Subsystem Class II

Average Day Demand: 131.7 MLD
Peak Day Demand: 185.9 MLD (July 12, 2012)
Population Served: 364,000 (est.)
Source Water: Surface Water (Lake Huron, Lake Erie)
Drinking Water System Number: 260004917
Municipal Drinking Water Licence: 006-101

CONTACT INFO:
Owner:
Corporation of the City of London
300 Dufferin Avenue, London, Ontario N6A 4L9
Contact: Mr. John Simon, P.Eng. Division Manager - Water Operations
519-661-2500 ext. 4938

London
CANADA

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Appendix 'A' – 2012 Annual Report

Appendix 'B' – 2012 Annual Report (Elgin-Middlesex Pumping Station – London Portion)

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Reporting Requirements

On February 28, 2013, a copy of the 2012 Annual Report for the City of London's water works was submitted to the local office of the Ministry of Environment (MOE) as a courtesy for information purposes. A copy of this Summary Report for the City of London Distribution System was also submitted, as a courtesy, to the local office of the MOE on March 15, 2013.

The Elgin-Middlesex Pumping Station (EMPS) (owned in part by the City of St. Thomas, the Town of Aylmer, and the City of London) was operated by American Water Canada Corporation (formerly American Water Services) from January 1, 2012 to July 1, 2012. From July 1, 2012 to December 31, 2012 the station was operated by the Ontario Clean Water Agency. The Annual Report for the EMPS (London portion) was attached as an appendix to London's Annual Report.

Schedule 22-2 of O. Reg. 170/03 requires that the City of London prepare a Summary Report for its water works system for the preceding calendar year and submit it to the members of the Municipal Council by March 31 of each year. This report, presented to Municipal Council's Civic Works Committee on March 18, 2013 serves to fulfill that requirement.

Ministry of Environment Annual Inspection

The Ministry of Environment commenced a focused inspection of the City of London's water system commencing on October 22, 2012. Operational and water quality records from January 1, 2012 through to the inspection date were requested and made available to the MOE Inspector. The inspection included a review of operational procedures, records of water sample analyses, and a review of the status of the certification and training for all of London's Water Operations staff. The Inspector spent several days inspecting the system facilities, reviewing records and interviewing staff.

The inspection determined that London's water system was being operated in accordance with all applicable regulations. All operators possessed the appropriate MOE Drinking Water Operator Certificates, all regulated water quality sampling during the period of January 1, 2012 through to October 22, 2012 was conducted, and all required reports to the MOE were submitted.

During the 2012 MOE Inspection of the City of London Water System, one issue of non-compliance was identified, which the MOE characterized as a "minor oversight", with no adverse impact on water quality. The MOE recognized that immediate steps were taken by Water Operations to make all staff fully aware of the proper procedures, and to ensure that this type of oversight will not be repeated.

A report on this MOE Inspection was made to the Civic Works Committee on February 4, 2013. For more information about this inspection or to review the report, it can be found at http://sire.london.ca/mtgviewer.aspx?meetid=437&doctype=AGENDA) .

Water Operations Staff Complement and Training

In 2012, the distribution system was operated and maintained by four (4) Water Supply staff, thirty-one (31) Operations and Maintenance staff, three (3) Water Works Inspectors, nine (9) Meter Shop staff, five (5) Supervisors, two (2) Technologists, two (2) Administrative staff, and four (4) Management staff. This complement does not include senior administrative staff that work in the Water Service Area. The majority of the City of London's operational and maintenance staff are based at the A.J. Tyler Operations Centre, located at 663 Bathurst Street. Water Supply staff are based out of the London Hydro building at 111 Horton Street.

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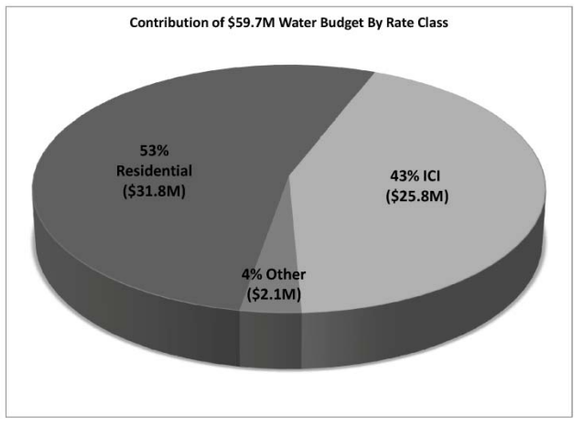
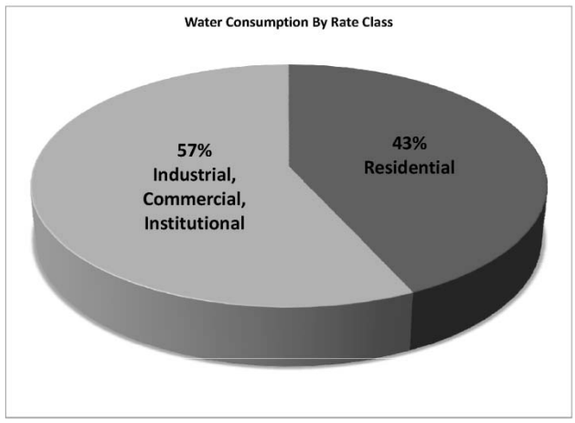
All employees with Drinking Water Operator Certificates receive a minimum of 14 hours of Director-approved training and an additional 36 hours of practical, on-the-job training each year, as mandated by Regulation.

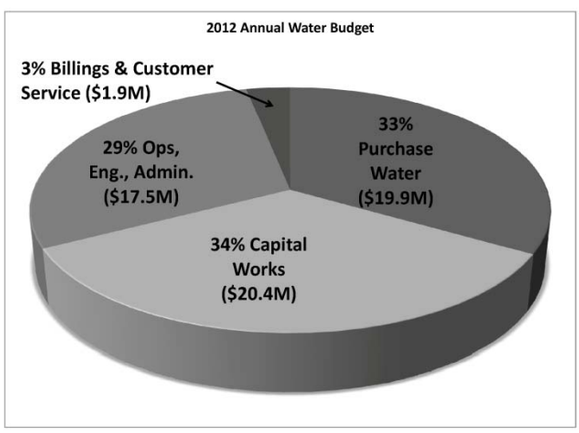
Water Budget



The 2012 Water Operating Budget was once again held at 0%, when adjusted to account for an increase in the cost to purchase water from the Regional Water System. This is the second consecutive 0% Operating increase. The 2012 Water Capital Budget received an increase of 8.0%, increasing the overall budget by $2.93 million to $59.7 million, which includes long term infrastructure renewal and replacement plans. The Water Budget helps maintain *London's Advantage* of a safe, clean and secure water supply for current and future generations of Londoners. London's aging water system infrastructure requires continuous renewal. In an effort to minimize financial impacts, recent investments have been directed towards new approaches and trenchless technologies, to ensure continued reliability of the water supply at an economical cost.



The 2012 average residential water consumption was 184.5 cubic metres, translating to a cost for water of approximately $24.99 per month, or about 82 cents per day. At this low cost, Londoners had access to a reliable, high quality supply of water to satisfy all their water needs (drinking, food preparation, sanitation, showers, laundry, dishwashing, etc.). Public health, fire protection, economic development and convenience further enhance *London's* Advantage through the provision of this essential service.



Average household water usage in London continues to decline, and has declined nearly 25% since 2001. There are a number of factors responsible for this trend; and although this results in a negative impact on water revenues, the overall impact of water conservation is a positive trend towards *Conserving the Future*, and should be encouraged.

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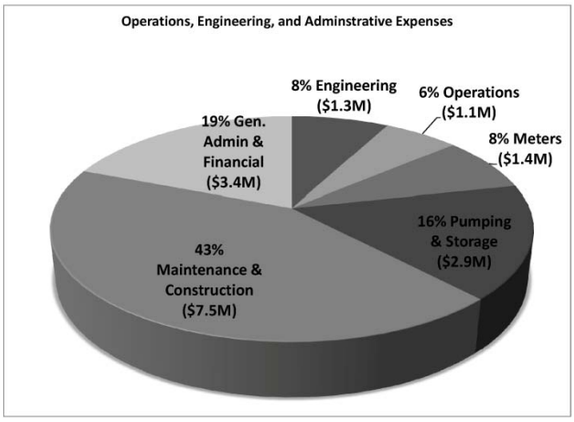

Working within budget limitations, the operational and capital works utilized a balanced approach toward the installation of new infrastructure in conjunction with the Growth Management Implementation Strategy, and the investment and renewal required to sustain the existing infrastructure. Reliable infrastructure and water system performance are not only key elements for economic development but also for quality-of-life and safety in the community. It is essential that proper funding of the water system is achieved and sustained in order to ensure that future generations are provided the same opportunity to a safe, clean and secure water supply.

Regulations, increasing standards and legislative obligations continued to require major investments in terms of staff time and financial resources. Staying abreast of regulatory developments and providing early input remains a key strategy in helping shape broader direction and control long term costs.

London's Water Service Area has maintained a relatively good financial position and continues to place London in the position of *Setting the Standard* as a utility with a secure and stable supply of high quality water. In the next few years, the water reserve funds are projected to be drawn down to a lower than normally acceptable level, and some debt is projected.

Ongoing Initiatives & Undertakings

Lead Mitigation Strategy – In 2006, the City of London implemented a program that allows Londoners to have lead concentrations in their tap water analyzed at no charge. Since that time, over 11,500 homes and businesses had their water sampled for lead. There are approximately 110,000 water service pipes in London. Prior to 1953, lead was a commonly used material for water service pipes, and in 2007 it was estimated that 9,000 London water services were fully, or partially, composed of lead. The City of London's lead service replacement programs have reduced this number to just over 5,500 by the end of 2012.

The City of London developed a three-pronged strategy for lead mitigation:

1. *Education and Awareness*: In addition to free lead testing, the City of London continues to provide information to Londoners regarding lead service pipes and the risks associated with lead. Enviroworks flyers (inserted with London Hydro/City of London Water bills) have been dedicated to lead awareness, a detailed brochure was prepared and delivered in conjunction with the Middlesex-London Health Unit, multiple press releases dating back to 2006, and an informative website are all employed to communicate with Londoners regarding this important topic.

2. *Water Chemistry Changes*: In conjunction with the Lake Huron and Elgin Area Primary Water Supply Systems, the City of London has investigated and initiated water chemistry changes that have reduced the uptake of lead. Increasing the pH of the water has reduced "at the tap" lead concentrations by nearly 50% from 2007 levels. It is anticipated that this program will continue to reduce lead levels

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in drinking water over the long term while providing other benefits to system operations.

3. *Replacement of Lead Service Pipes:* London's overall goal is the replacement of all lead services. This is an 18-year program which anticipates replacement of approximately 500 lead services per year. The majority of these service replacements will occur through the Capital Watermain Replacement Program. The remainder will occur through the Watermain Relining Programs and one-off replacements through the City's Lead Service Extension Replacement Program.

Water Meter Replacement Program –London's water system has been fully metered since the 1920's when there were approximately 20,000 customers. There are currently over 110,000 customers with water meters installed in their homes and/or businesses. Meters are mechanical devices which wear-out as they register consumption. The more consumption they measure, the less accurate they become over time. During the summer of 2008, randomly selected water meters, with varying amounts of measured consumption, were subjected to accuracy testing at low, medium and high flow consumption rates as per *AWWA Standard C700* and *AWWA Manual M6, Water Meters*. The results of the meter accuracy testing indicated that the life expectancy of a residential water meter was between 9 and 13 years (or 2,400 m^3 of consumption). This evaluation identified 51,000 water meters that were past due for replacement. It is estimated that older meters are costing the Water and Sewer Service Areas $630,000 per annum in unrealized revenue.

The Water Meter Replacement Program (WMRP) was initiated in 2009 after Council approval in December 2008. This strategy involved increasing the number of water meters replaced and installed from 5,000 per year to 10,000 per year. Another key factor of this strategy is the meter reading technology. Many of London's water meters were direct read (meaning the meter reader has to enter a customer's premise to read the meter) or rear yard remote read outs. These types of meters often result in estimated monthly bills due to non-access. The new water meter strategy took this into account and mandated all new and replacement meters to be radio read.

Through the deployment of new water metering technology and transitioning to a more automated system, the Water Service Area is reducing the meter reading costs. At the same time, customer's needs and requests are better met by:

- Allowing the City flexibility to select the best and most cost effective solution;
- Improving customer satisfaction through access to water usage data to handle billing disputes and customer inquiries;
- Improving the quality of our billing data with accurate and timely meter readings;
- Performing meter "right sizing" to ensure that the meter isn't over or under-sized, thus reducing metering inaccuracies and lost revenue;
- Reducing theft and revenue loss due to meter tampering;
- Effectively managing water conservation programs; and
- Decreasing water losses with proactive leak detection.

As of the end of 2012, more than 53,000 of the 110,000 water meters are radio read.

Water Efficiency: Large Diameter Concrete Pressure Pipe Watermain Inspection Program - Concrete Pressure Pipe (CPP) is a composite pipe manufactured using a thin

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steel cylinder wrapped in high tension wires, and coated internally and externally with cement mortar.

Over time the protective mortar can breakdown, exposing the steel cylinder and the pre-stressed wires to corrosion. As the pre-stressed wires corrode, some may break. If enough wires break, the pipe section may fail.

Significant failures of the Lake Huron Pipeline occurred In August 1983, June 1988, and March 2010, which threatened to leave the City without water. Fortunately the failures occurred outside of densely populated areas and were repaired by City crews in a timely fashion. There have never been any major failures of large concrete or concrete pressure pipes within the City of London; however, the age and construction practices for these watermains are similar to the Lake Huron Pipeline.

Within London, there are 160 km of large diameter concrete transmission mains moving millions of litres of water around the City. Some of these mains were constructed in the 1950's and 1960's and detailed inspection records outlining installation techniques and pipe integrity do not exist. The 19 km concrete watermain that connects the Arva Pumping Station with the Springbank Reservoirs is one of the most critical links in London's water system, and serves the majority of homes and businesses in London. In the summer and fall of 2007, three different inspections were undertaken on this pipe, as detailed below:

1. Leak Detection - provided a current condition of the pipe by determining if there are any leaks in the system.
2. Electromagnetic Inspection - provided a scientific analysis of the internal condition of the pre-stressed wires.
3. Visual Internal Inspection - determined if there is any breakdown in the internal concrete layer.

In addition, a fibre optic cable was floated inside nearly all of the 19 km from the Arva Pumping Station to the Springbank Reservoirs, providing the capability to continuously monitor the pre-stressed steel wires. The fibre optic cable registers an acoustic signature when a wire breaks, and immediate notification is sent to City staff. This real-time information received from the fibre will give staff the ability to react immediately, and prevent a potentially catastrophic pipe failure.

Water Efficiency: New Funding Model - The water and wastewater systems are customer owned and supported utilities. Water and sewer charges provide the revenue streams needed to sustain these utilities on a not-for-profit basis. City staff undertake the stewardship roles to ensure that the utilities are well managed and maintained for current and future generations. Total revenues for the two utilities are approximately $135,000,000 (2012 budget). On March 1, 2013, a new funding model was implemented. The previous model was based on formulae that varied depending on the type of customer (aggregated into classes), their water consumption, sanitary sewage generated and land area of their property. The previous rate structure was established more than 22 years ago for water, and 15 years ago for sanitary and stormwater rates. It had been identified as being one of the most complex rate structures in Ontario and contained inequities between customer classes and lacked consistency between the water and sewer customer classes and rate structures.

The new funding model provides for more stable revenues, ensures conservation, provides accommodation for low volume users and supports economic development while achieving sustainability sooner and at a lower cost to customers. It also ensures intergenerational equity between present and future rate payers.

The new funding model is structured in the following manner:

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	Water	Sanitary	Storm Drainage
Volumetric Component	$ per cubic metre	$ per cubic metre	None
Fixed Component	Capital Renewal Charge Fire Protection Charge	Capital Renewal Charge	Flat Rate for small properties Area Rate for large properties

This model combines the residential inclining block structure with the ICI declining block structure. The premise of this model is that the true cost of infrastructure is related to how much water flows through the pipes to service the customers. The fixed charge covers the basic hard infrastructure and part of the volumetric rate covers the fixed operating and maintenance costs, while the variable costs are covered by the remaining volumetric rate. The initial blocks then pay for the total infrastructure costs and very high industrial users pay an incremental rate for cost of the water, pumping and treatment. The declining nature of the higher blocks reflects the proportionately lower cost to service larger volume users – economies of scale.

The main premise of the model, illustrating the total cost to a customer is that:

- fixed costs related to infrastructure renewal including fire protection are recovered as a fixed charge,
- fixed costs related to operation and maintenance of the infrastructure will continue to be collected as a volumetric charge based on pipe value to encourage conservation, and
- variable volumetric costs related to the treatment and pumping of the water/wastewater are shared equally among all customers.

Emerging Trends in Water Treatment & Regulations

Water Treatment: The City of London purchases its treated drinking water from the Joint Boards of Management (Lake Huron and Elgin Area Primary Water Supply Systems). The Joint Boards of Management, through the Regional Water Supply Division, stay abreast of emerging trends in water treatment and monitor upcoming Regulations. Current areas of interest include Microbiologicals (E. coli and Total Coliform), Disinfection By-Products (Trihalomethane (THM), Haloacetic Acids (HAA)), Lead and Copper, and Emerging Pathogens and Chemicals.

Currently, there are no water quality concerns requiring process modification at the Regional Water Supply treatment facilities. The area of emerging contaminants including pharmaceuticals and personal care products (PPCP's) and endocrine disruptors (EDC's) will be the focus of much research in the coming decades. At this time, there is no evidence to suggest that the Joint Board of Management should conduct further investigations into the implementation of advanced or enhanced treatment processes at either the Lake Huron or Elgin Area Treatment Plants.

For further information on emerging trends in water treatment and Regulations, please refer to the Lake Huron and Elgin Area Water Supply Systems Master Plans, which can be found at http://www.watersupply.london.ca/reports.html .

Standard of Care Provision in Ontario's Safe Drinking Water Act, 2002: On December 31, 2012, Section 19 of the *Safe Drinking Water Act, 2002* came into force. It imposed a statutory standard of care on the "owner of a municipal drinking water system, and every person who, on behalf of the municipality, oversees the accredited operating authority of the system or exercises decision-making authority over the system". This standard of care requires that such persons (a) exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation; and (b) act honestly, competently and with

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integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system.

Actions that can be taken to satisfy the standard of care requirement include: obtaining and following proper expert advice, and ensuring that the water system is operated by an accredited operating authority. As has been previously reported to Council, the City of London Water Operations and Water Engineering Divisions have been recognized as an accredited operating authority for the City of London Water System.

For more information regarding the Standard of Care provision, a full report was presented to Civic Works Committee on October 22, 2012.

Safeguarding and Sustaining Ontario's Water Act: We continue to work with the Ontario Ministries of Environment and Natural Resources in the development of Regulations under the Safeguarding and Sustaining Ontario's Water Act; which addresses the obligations of the Great Lakes & St. Lawrence River Basin Water Resources Agreement with eight US States and the Provinces of Ontario and Quebec. In particular, Regulations with respect to intra-basin transfers have the potential to significantly and negatively impact a large area of southwestern Ontario by potentially limiting the amount of water which can be supplied from the Lake Huron system at present and in the future, likely resulting in the expenditure of hundreds of millions of dollars to replace capacity that is currently available. Meetings with the Ministries appear to have been fruitful in that current policy discussions and drafting of Regulations may allow London and area municipalities the ability to continue to utilize existing infrastructure to its full permitted capacity.

Algal Blooms in the Great Lakes: Algal blooms usually occur in the late summer and early fall. A bloom is a large mass of algae that is formed as a result of a number of ecosystem changes. These changes are brought about by an elevated presence of nutrients, invasive species such as quagga mussels, or light and temperature conditions that are favourable for the algae to multiply quickly.

There is more than one variety of algae. When alive they provide food for a variety of fish. When algae blooms die, some of the varieties release odorous chemicals into the water that can affect the taste and/or smell of our drinking water. Others, such as some types of blue-green algae (cyanobacteria), release toxins that can cause health issues for humans and animals. As such, algae blooms have the potential to negatively impact drinking water quality, recreational activities, tourism, commercial fisheries and lakeshore property values.

The Ministry of Environment has a protocol in place for responding to occurrences of blue-green algal blooms in Ontario lakes. MOE staff work closely with the local Medical Officers of Health to ensure that timely, appropriate action is taken. Local Medical Officers of Health address public health concerns with respect to blue-green algal blooms, and communicate with consumers and drinking water system owners within their area.

A survey conducted by ministry staff for cyanobacterial toxins at 18 drinking water facilities from 2004 to 2010, suggests that water treatment plants have been effective at removing or inactivating these toxins in drinking water.

The recurrence of algal blooms in certain areas of the Great Lakes, such as Lake Erie, has prompted discussions with the International Joint Commission, federal, state and other Provincial governments as well as non-government bodies to improve the ecological conditions of our Great Lakes.

A.U.G. Signals Research Partnership: A.U.G. Signals Ltd. (Airborne Underwater Geophysical Signals) specializes in signal, image and data processing, with most of their technologies having been applied to, and validated by, military systems.

A.U.G. has utilized spectrophotometric sensors to create the TRITON Intelligent Water

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Surveillance Monitor. The TRITON monitors are designed to provide online, real-time, 24/7 detection and quantification of water contaminants in municipal drinking-water distribution systems.

In order to validate and demonstrate the functionality of their technology, A.U.G. and the City of London have entered a 3 year pilot project partnership to install TRITON monitors in an actual water distribution system creating "Intelligent Drinking Water Monitoring Systems" (IDWMS).

The objective of the 3-year A.U.G./City of London partnership is to create a pilot demonstration of the IDWMS in the City of London. As such, City of London and AUG have agreed to work to achieve the following:

1. To deploy the IDWMS at seven (7) selected locations within the City of London;
2. To setup a Command and Control Centre in the City of London;
3. To train City of London personnel on system operation and data interpretation;
4. To validate the system in the City of London; and,
5. To demonstrate the system to other municipalities and the media.

Ontario Ministry of Economic Development and Innovation (MEDI) has provided A.U.G. with a forgivable loan, covering 50% of eligible project costs. The City of London would also incur some costs through its participation in the project, primarily labour costs for staff involvement. A.U.G. will reimburse the City of London for 50% of the eligible expenses incurred by the City of London, up to $50,000.

During the 3-year trial, the City of London would continue to use existing technology to meet its regulated monitoring and reporting requirements.

In 2011, London received approximately $6 million in funding to help establish clean water technologies through the Southern Ontario Water Consortium (SOWC). The International Water Excellence Centre (IWCE) being established in London is a partnership of the City of London, Western University, the London Economic Development Corporation (LEDC) and private sector partners Trojan Technologies and Purifics. The IWCE will be London's node in the SOWC. The Centre will make London the leading site for industrial water treatment technology commercialization, validation and testing in Canada. The Memorandum of Understanding between the City of London and A.U.G. allows for the possible inclusion of A.U.G.'s "Intelligent Drinking Water Monitoring System" within the IWCE.

OnWARN: Ontario Water/Wastewater Agency Response Network: This initiative, based upon the principle of "*Utilities helping Utilities*", has gained momentum throughout the water utility sector in Ontario, Canada and the United States, as a means of providing voluntary mutual-aid to similar utilities within a region. The OnWARN program establishes a legal framework whereby any subscribing utility can call upon the assistance of other subscribing utilities, with the response being provided within the context of a blanket "mutual aid" type of agreement. The blanket agreement covers all aspects of legal liability, availability of response and the provision of services, and health and safety requirements, to name a few.

Participation in the OnWARN program does not specifically require a subscribing municipality to respond to any and all calls for assistance, nor does it obligate a subscribing municipality to call upon all subscribers for assistance in the event of an emergency. It also does not require a municipality to formally declare a state of emergency, only that the water or wastewater related circumstance is beyond the capabilities of the municipality.

Recognizing the significant benefit of joining OnWARN and improving emergency preparedness for the City's water and wastewater services, staff submitted a report to Civic Works Committee, on February 25, 2013, to seek Council's authorization for the Mayor and Clerk to execute an Agreement to join OnWARN.

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Sampling & Water Quality Monitoring

During 2012, staff conducted water sampling from the distribution system which exceeded the MOE's minimum requirements. On average, staff take 180 samples monthly, from 57 standard locations across the City; testing for microbiological indicators and chlorine residuals. In addition, analysis is performed for up to 137 parameters, including organics, inorganics, pesticides and metals at 13 standard locations around the City. 7,838 routine grab samples were taken from the distribution system, 1,354 samples taken from the stand-by wells, as well as over 2,376 chlorine residual tests conducted by London staff. London also has 10 locations throughout the city where continuous in-line sampling of chlorine residual is monitored. Staff also perform approximately 4,000 chlorine tests (on the Distribution System and for Construction Projects and Bacteriological sampling upon repairs undertaken) each year that are not included in the above numbers. All of these efforts help ensure that the water within the distribution system is always of high quality.

Below is the historical range (since 2000) of sample results for London's drinking water.

Parameter	ODWS[1] Maximum Acceptable Concentration (MAC)	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
REGULATED INORGANICS						
Antimony	6	0.02	µg/L	**0.100 - 0.140**	No	0.020 - 1.200
Arsenic	25	0.2	µg/L	**0.300 - 0.700**	No	0.001 - 2.000
Barium	1000	0.05	µg/L	**14.600 - 22.700**	No	0.015 - 25.000
Boron	5000	1	µg/L	**15.000 - 21.000**	No	0.020 - 40.000
Cadmium	5	0.003	µg/L	**0.003 - 0.003**	No	0.002 - 0.100
Chromium	50	0.5	µg/L	**0.500 - 0.500**	No	0.004 - 3.000
Fluoride	1.5	0.06	mg/L	**0.090 - 0.970**	No	0.030 - 1.390
Free Chlorine Residual	--	--	mg/L	**0.080 - 1.990**	No	0.000 - 1.990
Lead	10	0.02	µg/L	**0.030 - 0.380**	No	0.002 - 1.070
Mercury	1	0.02	µg/L	**0.020 - 0.020**	No	0.000 - 0.100
Selenium	10	1	µg/L	**0.100 - 1.000**	No	0.005 - 3.000
Sodium[3]	20*	0.01	mg/L	**1.000 - 10.000**	No	1.000 - 12.000
Uranium	20	0.001	µg/L	**0.032 - 9.700**	No	0.001 - 9.700

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Parameter	ODWS[1] Maximum Acceptable Concentration (MAC)	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
REGULATED ORGANICS						
Alachlor	5	0.020	µg/L	**0.020 <MDL**	No	0.002 - 0.200
Aldicarb	9	0.010	µg/L	**0.010 <MDL**	No	0.005 - 5.000
Aldrin + Dieldrin	0.7	0.010	µg/L	**0.010 <MDL**	No	0.000 - 0.067
(Aldrin)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.060
(Dieldrin)	--	0.010	µg/L	**0.010 <MDL**	No	0.001 - 0.067
Atrazine	--	0.020	µg/L	**0.020 - 0.090**	No	0.020 - 0.130
Atrazine + N-dealkylated metabolites	5	0.040	µg/L	**0.030 - 0.120**	No	0.003 - 0.500
Azinphos-methyl	20	0.020	µg/L	**0.020 <MDL**	No	0.010 - 1.000
Bendiocarb	40	0.010	µg/L	**0.010 <MDL**	No	0.010 - 1.000
Benzene	5	0.32	µg/L	**0.320 <MDL**	No	0.005 - 0.400
Benzo(a)pyrene	0.01	0.004	µg/L	**0.004 <MDL**	No	0.000 - 0.009
Bromoxynil	5	0.33	µg/L	**0.330 <MDL**	No	0.003 - 0.330
Carbaryl	90	0.010	µg/L	**0.010 <MDL**	No	0.010 - 1.000
Carbofuran	90	0.010	µg/L	**0.010 <MDL**	No	0.005 - 5.000
Carbon tetrachloride	5	0.16	µg/L	**0.160 <MDL**	No	0.005 - 0.410
Chlordane (Total)	7	0.010	µg/L	**0.010 <MDL**	No	0.000 - 0.200
(a-chlordane)	--	0.010	µg/L	**0.010 <MDL**	No	0.007 - 0.200
(g-chlordane)	--	0.010	µg/L	**0.010 <MDL**	No	0.007 - 0.200
(oxychlordane)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.360
Chlorpyrifos	90	0.020	µg/L	**0.020 <MDL**	No	0.008 - 5.000
Cyanazine	10	0.030	µg/L	**0.030 <MDL**	No	0.008 - 0.500
Diazinon	20	0.020	µg/L	**0.020 <MDL**	No	0.002 - 2.000
Dicamba	120	0.20	µg/L	**0.200 <MDL**	No	0.050 - 10.000
1,2-Dichlorobenzene	200	0.41	µg/L	**0.410 <MDL**	No	0.003 - 1.000
1,4-Dichlorobenzene	5	0.36	µg/L	**0.360 <MDL**	No	0.001 - 0.400
DDT + Metabolites	30	0.010	µg/L	**0.010 <MDL**	No	0.005 - 0.500
(op-DDT)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.500
(pp-DDD)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.500
(pp-DDE)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.500
(pp-DDT)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.500
1,2-Dichloroethane	5	0.35	µg/L	**0.350 <MDL**	No	0.005 - 0.430
1,1-Dichloroethylene	14	0.33	µg/L	**0.330 <MDL**	No	0.005 - 0.520
Dichloromethane	50	0.35	µg/L	**0.350 <MDL**	No	0.005 - 3.000
2,4-dichlorophenol	900	0.15	µg/L	**0.150 <MDL**	No	0.000 - 0.150
2,4-D	100	0.19	µg/L	**0.190 <MDL**	No	0.044 - 5.000
Diclofop-methyl	9	0.40	µg/L	**0.400 <MDL**	No	0.005 - 0.840
Dimethoate	20	0.030	µg/L	**0.030 <MDL**	No	0.005 - 1.000
Dinoseb	10	0.36	µg/L	**0.360 <MDL**	No	0.005 - 0.500
Diquat	70	1	µg/L	**1.000 <MDL**	No	1.000 - 70.000
Diuron	150	0.030	µg/L	**0.030 <MDL**	No	0.030 - 0.660
Glyphosate	280	6	µg/L	**6.000 <MDL**	No	0.010 - 10.000
Heptachlor + Heptachlor Epoxide	3	0.010	µg/L	**0.010 <MDL**	No	0.001 - 0.300
(heptachlor)	--	0.010	µg/L	**0.000 - 0.010**	No	0.010 - 0.300
(heptachlor epoxide)	--	0.010	µg/L	**0.010 <MDL**	No	0.010 - 0.300
Lindane (Total)	4	0.010	µg/L	**0.010 <MDL**	No	0.002 - 0.200
Malathion	190	0.020	µg/L	**0.020 <MDL**	No	0.020 - 5.000
Methoxychlor	900	0.010	µg/L	**0.010 <MDL**	No	0.010 - 5.000
Metolachlor	50	0.020	µg/L	**0.010 - 0.040**	No	0.008 - 5.000
Metribuzin	80	0.020	µg/L	**0.020 <MDL**	No	0.020 - 5.000
Monochlorobenzene	80	0.30	µg/L	**0.300 <MDL**	No	0.005 - 5.000
Paraquat	10	1	µg/L	**1.000 <MDL**	No	0.010 - 9.000
Parathion	50	0.020	µg/L	**0.020 <MDL**	No	0.020 - 1.200
Pentachlorophenol	60	0.15	µg/L	**0.150 <MDL**	No	0.001 - 1.000

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Parameter	ODWS[1] Maximum Acceptable Concentration	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
REGULATED ORGANICS CONTINUED						
Phorate	2	0.010	µg/L	**0.010 <MDL**	No	0.001 - 0.730
Picloram	190	0.25	µg/L	**1.000 <MDL**	No	0.043 - 5.000
Polychlorinated Biphenyls (PCBs)	3	0.04	µg/L	**0.040 <MDL**	No	0.001 - 0.100
Prometryne	1	0.030	µg/L	**0.030 <MDL**	No	0.001 - 0.230
Simazine	10	0.010	µg/L	**0.010 <MDL**	No	0.005 - 0.500
Temephos	280	0.010	µg/L	**0.010 <MDL**	No	0.010 - 15.000
Terbufos	1	0.010	µg/L	**0.010 <MDL**	No	0.001 - 0.730
Tetrachloroethylene	30	0.35	µg/L	**0.000 - 0.350**	No	0.005 - 1.000
2,3,4,6-tetrachlorophenol	100	0.14	µg/L	**0.000 - 0.140**	No	0.001 - 0.500
Triallate	230	0.10	µg/L	**0.010 <MDL**	No	0.010 - 5.000
Trichloroethylene	50	0.43	µg/L	**0.440 <MDL**	No	0.005 - 1.000
2,4,6-trichlorophenol	5	0.25	µg/L	**0.250 <MDL**	No	0.001 - 0.890
2,4,5-T	280	0.22	µg/L	**0.220 <MDL**	No	0.005 - 5.000
Trifluralin	45	0.020	µg/L	**0.020 <MDL**	No	0.020 - 1.000
Vinyl Chloride	2	0.17	µg/L	**0.000 - 0.170**	No	0.002 - 0.170

Parameter	ODWS[1] Maximum Acceptable Concentration (MAC)	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
NITRATES						
Nitrate (as nitrogen)	10	0.013	mg/L	**0.005 - 0.342**	No	0.005 - 1.700
Nitrate + Nitrite (as nitrogen)	10	0.013	mg/L	**0.005 - 0.342**	No	0.005 - 1.700
Nitrite (as nitrogen)	1	0.005	mg/L	**0.005 - 0.129**	No	0.005 - 0.129

Parameter	ODWS[1] Maximum Acceptable Concentration (MAC)	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
TRIHALOMETHANES						
Trihalomethanes (total)	100	0.37	µg/L	**12.000 - 44.000**	No	0.010 - 57.000
Bromoform	--	0.34	µg/L	**0.200 - 0.340**	No	0.002 - 2.000
Chloroform	--	0.29	µg/L	**4.800 - 28.000**	No	0.002 - 39.000
Dibromochloromethane	--	0.37	µg/L	**2.400 - 4.600**	No	0.002 - 5.400
Bromodichloromethane	--	0.26	µg/L	**4.300 - 11.000**	No	0.002 - 12.000

Parameter	ODWS[1] Maximum Acceptable Concentration (MAC)	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
MICROBIOLOGICAL						
E. Coli	0	0	CFU/100mL	**0 - 1**	No	0 - 1
Total Coliform	0	0	CFU/100mL	**0 - 41**	Yes	0 - 41
Heterotrophic Plate Count	--	10	cfu/1mL	**10 - 2000**	No	10 - 2000

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Parameter	ODWS[1] Maximum Acceptable Concentration (MAC)	Lab's Method Detection Limit (MDL) 2012	Units	Measured Concentrations 2012	MAC Exceedence in 2012 (Y/N)	Historical Measured Concentration Range[2]
NON-REGULATED INORGANICS/ORGANICS[4]						
Alkalinity	--	2	mg/L as CaCO3	75.000 - 82.000	No	61.000 - 90.000
Aluminum	--	0.2	µg/L	39.800 - 58.500	No	0.030 - 436.0
Ammonia+Ammonium (N)	--	0.04	mg/L	0.040 - 0.040	No	0.040 - 0.400
Calcium	--	0.03	mg/L	26.600 - 34.000	No	25.800 - 38.000
Chloride	--	0.03	mg/L	8.800 - 19.000	No	7.200 - 36.100
Cobalt	--	0.002	µg/L	0.017 - 0.050	No	0.004 - 0.300
Colour	--	3	TCU	3.000 - 3.000	No	3.000 - 13.000
Conductivity	--	1	uS/cm	240.0 - 290.0	No	205.0 - 313.0
Copper	--	0.5	µg/L	4.000 - 7.400	No	1.300 - 64.000
Cyanide	0.2	0.002	mg/L	0.002 - 0.002	No	0.002 - 0.010
De-ethylated atrazine	--	0.010	µg/L	0.010 - 0.030	No	0.010 - 0.140
Dissolved Organic Carbon	--	0.2	mg/L	1.600 - 1.900	No	0.400 - 2.200
Ethylbenzene	--	0.33	µg/L	0.330 - 0.330	No	0.002 - 1.000
Field pH	--	--	units	N/A - N/A	N/A	6.660 - 8.600
Gross Alpha	--	0.100	Bq/l	N/A - N/A	N/A	0.100 - 0.100
Gross Beta	--	0.100	Bq/l	N/A - N/A	N/A	0.100 - 0.100
Hardness	--	0.1	mg/L as CaCO3	98 - 120.0	No	95.000 - 133.0
Iron	--	2.000	µg/L	3.000 - 27.000	No	2.000 - 90.000
Langolier's Index	--	0.000	@ 20 C	-0.380 - -0.310	No	-1.070 - -0.130
m/p-xylene	--	0.39	µg/L	0.390 - 0.390	No	0.390 - 5.000
Magnesium	--	0.003	mg/L	7.770 - 8.550	No	7.150 - 9.400
Manganese	--	0.01	µg/L	0.250 - 5.110	No	0.001 - 168.0
Nickel	--	0.1	µg/L	0.600 - 0.900	No	0.3 - 1.4
Nitrogen-Kjeldahl (N)	--	0.05	mg/L	0.070 - 0.100	No	0.050 - 0.500
Organic Nitrogen	--	0.05	mg/L	0.070 - 0.070	No	0.040 - 0.340
o-xylene	--	0.17	µg/L	0.170 - 0.200	No	0.170 - 5.000
pH	--	0.05	no unit	7.850 - 7.920	No	7.050 - 8.110
Potassium	--	0.01	mg/L	1.070 - 1.660	No	0.940 - 1.910
Silica	--	0.01	mg/L	1.060 - 1.540	No	0.590 - 2.1
Silver	--	0.01	µg/L	0.010 - 0.010	No	0.003 - 0.100
Solids (Total Dissolved)	--	30	mg/L	131.0 - 149.0	No	1.460 - 208.0
Sulphate	--	0.06	mg/L	28.000 - 32.000	No	27.000 - 55.000
Sulphide	--	0.004	mg/L	0.006 - 0.015	No	0.004 - 4.000
Surr 1,2-Dichloroethane-d4	--	--	mg/L	104.00 - 105.00	No	104.00 - 105.00
Surr 4-Bromofluorobenzene	--	--	Surr Rec %	97.000 - 99.000	No	97.000 - 99.000
Surr Decachlorobiphenyl	--	--	%	94.000 - 95.000	No	94.000 - 95.000
Toluene	--	0.36	µg/L	0.360 - 0.360	No	0.005 - 1.000
Total Chlorine	--	0.550	mg/L	0.000 - 0.000	No	0.520 - 1.800
Total Phosphorus	--	0.02	mg/L	0.020 - 0.020	No	0.020 - 0.070
Toxaphene	--	5.000	µg/L	5.000 - 5.000	No	0.010 - 5.000
2,4,5-TP (Silvex)	--	0.130	µg/L	0.100 - 0.130	No	0.010 - 5.000
Tritium	7000	15.0	Bq/l	N/A - N/A	N/A	15 - 15
Turbidity	1	0.13	NTU	0.230 - 0.330	No	0.030 - 0.500
Xylene; total	--	0.39	µg/L	0.390 - 0.390	No	0.005 - 5.000
Zinc	--	1	µg/L	4.000 - 4.000	No	0.300 - 100.0

[1]ODWS - Ontario Drinking Water Standards
[2]Historical range goes back to 2000
[3]Sodium is regulated to be tested every 60 months
[4]The City of London consistently goes beyond the minimum testing requirements of the ODWS and samples these parameters as well

There were five (5) adverse microbiological results out of 2,468 samples taken; all due to unacceptable levels of Total Coliform bacteria (one with a combination of unacceptable E. Coli and Total Coliform). In each case, standard response procedures were enacted. All sites were re-sampled immediately, and the re-sample results revealed no adverse indicators.

It is highly unlikely that there were 'actual' water quality issues at these sites, as the five adverse samples were identified as having free chlorine residuals which were well above the minimum acceptable level at the time of the sampling (ranging between 0.26 to 0.72 mg/L). Coliform bacteria cannot survive in chlorinated water; therefore, it is suspected that post-sampling contamination occurred. The re-sampling results support this conclusion. The microbiological testing procedure is extremely sensitive. Accidental sample contamination can occur through operator or laboratory error, despite the specific procedures and precautions adhered to.

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APPENDIX 'A'
2012 DRINKING WATER SUMMARY REPORT

System Statistics and Major Events

During the period from January 1, 2012 through to December 31, 2012 a total of 48,493,521,000 litres of water were purchased from the Joint Water Boards and subsequently pumped into London via the Arva Pumping Station and EMPS. Average day demand was 131,723,230 litres. Peak day pumpage of 185,876,000 litres occurred on July 12, 2012.

A summary of system pumpage can be found in the PDF version of this report that has been provided to members of Council. The data includes monthly average and maximum daily flows. These values are also compared to the rated flow rate capacities identified in London's Municipal Drinking Water Licence. There were no occurrences of flow rate exceedance during the specified time period.

Listed below are some 2012 statistics for the City of London Distribution System.

Approximate Replacement Value of Drinking Water System	**$1,800,000,000**
Number of Pumping Stations	**7**
Number of Fire Hydrants	**8,664**
Number of Watermain Valves	**12,405**
Total Number of Water Services	**110,485**
ICI Water Services	9,748
Residential Water Services	100,737
Length of Watermain	**1,555 km**
Length of New Watermain Installed	12 km
Length of Watermain Replaced	7.2 km
Length of Watermain Rehabilitated	5.7 km
Number of Watermain Breaks	**104**

Municipalities Receiving London Water

In the Municipality of Middlesex Centre, Arva Village, Ballymote, and Delaware continued to receive their drinking water under contract from the City of London during 2012. The Municipality of Middlesex Centre has been provided a copy of the Annual Report as per O. Reg 170/03.

Several residences within Central Elgin also continued to receive drinking water from the transmission watermain that supplies the City of London from the EMPS. For this reason, Central Elgin has also been provided a copy of the report.