

Township of Lucan-Biddulph

Drinking Water Quality Management System (DWQMS)

Operational Plan

*Owned
by:*

Township of Lucan-Biddulph



*Operated
by:*

JACOBS
Operations Management International Canada Inc.

JACOBS®

LUCAN BIDDULPH WATER DISTRIBUTION SYSTEM QUALITY MANAGEMENT SYSTEM OPERATIONAL PLAN

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1. QUALITY MANAGEMENT SYSTEM

This document will be the Quality Management System Operational Plan for the Lucan Biddulph Water Distribution System #260003071.

The Quality Management System for Lucan Biddulph covers the transmission and distribution of potable drinking water to consumers within the Township of Lucan Biddulph. Treated potable drinking water is purchased from the producer Lake Huron Primary Water Supply System 210000791 (LHPWSS). The water enters the Lucan Biddulph system from one (1) take-off point on the main LHPWSS transmission line. The Township of Lucan Biddulph is also a board member and part owner of the supplying system being LHPWSS.

2. QUALITY MANAGEMENT SYSTEM POLICY

The QMS Policy is in place and is as follows:

JACOBS, on behalf of the Township of Lucan Biddulph, is committed to supplying a safe, consistent drinking water supply while maintaining strict adherence to all applicable legislative and regulatory requirements. We strive to achieve these goals through the implementation of a management system comprised of policies, procedures, instructions and forms that demonstrate risk-based treatment processes, evaluation, staff competency, open communication, workplace safety, and appropriate contingency/emergency response procedures.

Together, the Township of Lucan Biddulph and JACOBS are committed to:

- Managing and operating the drinking water systems in a responsible manner in accordance with documented quality management policies and procedures.
- Providing the customer with clean, safe drinking water.
- Maintaining and continually improving each quality management system.
- Complying with applicable regulations and legislation.
- Providing the QMS in a form that can be communicated to the Operating Authority personnel, owner and the public.

The Township and Operating Authority are committed to accomplishing our goals through the dedication, support and participation of all, and through the maintenance and continual improvement of the Quality Management

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Systems.

3. COMMITMENT AND ENDORSEMENT

In conjunction with endorsement from top management, the owner (Mayor and Council) has passed a motion to endorse the operational plan of the DWQMS and will review revisions as necessary.

The owner and top management will re-endorse the operational plan when there is a major change in the plans intent, or when the signing parties change.

Refer to: **ANNEX B, Council Endorsement**

Refer to: **ANNEX C, Management Endorsement**

4. QUALITY MANAGEMENT SYSTEM REPRESENTATIVE

Top Management appoints and authorizes the QMS Representative to maintain and revise the Operational Plan.

Top Management for JACOBS on behalf of the Township of Lucan Biddulph has appointed the Quality Management System Representative to be:

Nicole Boyle, Water Operator

The QMS representative will develop, implement, maintain and report the effectiveness as well as the need for improvement of the QMS to the owner. They will also ensure that the current versions of the documents required by the QMS are in use at all times. The representative will promote the QMS throughout the water department and see that personnel are aware of all current legislation and regulatory requirements that are relevant to the operation.

5. DOCUMENT AND RECORDS CONTROL

All records required by the Ministry of the Environment O Reg. 128/04 and O. Reg.170/03 to demonstrate compliance and or conformance shall be maintained per the aforementioned regulations.

All materials received are reviewed, acted upon (if need be), filed in labeled folders in a filing cabinet, placed in a binder or filed electronically on the network Sharepoint site. This material will then be retained and archived for the duration as outlined in the "Records Availability Chart" in Procedure A.

To ensure all DWQMS documents are current, legible, readily identifiable, retrievable, stored, protected, and disposed of properly Procedure A must be adhered to.

Refer to: **PROCEDURE A**

6. DRINKING WATER SYSTEM

The Lucan Biddulph Water Distribution System (LBWDS) includes one (1) inline booster station known as the Lucan Water Station, one (1) elevated storage tower, one (1) reservoir, and one (1) reservoir pumping station known as the Granton Water Station. All of which provide water to the urban centre's known as Lucan and Granton as well as some rural residents within the Township of Lucan Biddulph.

Refer to: **ANNEX D**

The Lucan Biddulph Water distribution System (LBWDS) is owned by the Township of Lucan Biddulph and operated by JACOBS. JACOBS is also responsible for implementing and maintaining the Quality Management System.

As stated previously, the township purchases potable drinking water from the LHPWSS which is owned by the Lake Huron Primary Water Supply System Joint Board of Management and is operated by the Ontario Clean Water Agency. Re-chlorination is practiced only at the Granton Water Station. The treatment and quality of the water is controlled by the water supplier, the LHPWSS, which does relevant sampling, testing and monitoring upstream. They have on-line chlorine residual analyzers on the treated water leaving the plant as well as downstream in London. Typically the water as supplied by the LHPWSS has sufficient residual chlorine to ensure that regulatory requirements are met within the Lucan Biddulph distribution system. However re-chlorination occurs at the Granton Water Station and Reservoir which supplies the community of Granton with drinking water.

JACOBS along with the township operates one (1) elevated storage tower and one (1) reservoir to provide temporary storage of roughly 12 hours of normal use or 4 hours of fire flow conditions. In Granton, supply water pumps are used to increase pressure within the system. All buildings are equipped with intrusion alarms.

All customers within the system are metered. These meters are read on a quarterly basis. There is no discount within our system for large users and all bills are calculated on a combination of a flat rate and cubic meter rate.

All new buildings and Developments that are connected to the Lucan Biddulph Water Distribution System (LBWDS) are equipped with Backflow Preventers by the township staff as part of the building permit process.

The sizing of the meter and port at the take-off chamber and the size of our booster pumps at the Lucan Water Station controls our capacity. Peak demands are very constant and daily peaks occur at approximately 7:00 a.m. and 5 p.m. There is a minimal amount of change between summer and winter demands.

The Township of Lucan Biddulph also provides potable water to a small section of the North Middlesex Secondary Water Distribution System (260006529). This system is owned by the Municipality of North Middlesex and operated by Ontario Clean Water Agency. The area serviced is predominantly along Denfield Road from William Street to the Community of Clandeboye.

7 & 8. RISK ASSESSMENT AND OUTCOMES

Refer to: **PROCEDURE B**

9. OPERATIONAL STRUCTURE, ROLES, RESPONSIBILITIES AND AUTHORITIES

The Township of Lucan Biddulph is the Owner and provides governance for all water systems within. Each system is described within Element 6. The Township utilizes the services of an independent contract Operating Authority (JACOBS) who operates and maintains all water systems on behalf of the Township. Under the QMS, the Operating Authority is responsible for implementing and maintaining the QMS in partnership with the Township.

Refer to: **ANNEX E**

The QMS Representative shall keep the operational structure, the respective roles and responsibilities, and the authorities current. He shall also communicate this information to the owner and personnel.

Refer to: **ANNEX E**

Refer to: **ANNEX F**

10. COMPETENCIES

The table below lists the minimum levels of competencies required of trained JACOBS staff whose performance may have a direct impact on drinking water quality.

According to O. Reg. 128/04, all operators (not including the ORO) are required to possess, at a minimum, a valid OIT certificate in Water Treatment and Water Distribution. The ORO must hold, at a minimum, a certificate matching the class of the facility.

Operator Training Hours

Training can be provided by the OA or a qualified third-party contractor in addition to the regulatory requirements to maintain licensing, all water system operations staff must complete the following training within a reasonable period of time of beginning employment, unless scheduling does not permit (more for remote locations):

Role	Competency Expectations
Overall Responsible	Minimum licensing to the level of the system classification Understanding of DWQMS
Operator in Charge	Minimum Class I Water Distribution Understanding of DWQMS
Operator	Minimum OIT in Water Distribution Understanding of role within DWQMS

Satisfying Competencies

- Project manager is responsible for maintaining competencies listing
- On-the-Job training is provided by JACOBS and other contractors
- Relevant on-the-job training sessions are determined by project manager, or designate
- Resources are provided by JACOBS for external training
- It is the responsibility of both the operator and JACOBS to ensure competency expectations are met
- If an employee is hired without the full competency requirements, they are not assigned full duties (as a condition of employment), and then regular internal / external training is conducted to acquire the competency requirements

Relevance of Duties

- Personnel are made aware of the relevance of their duties through the DWQMS staff information meetings
- New employees are introduced to the DWQMS during on-the-job training
- The DWQMS policy is posted at the Water Department

Training Records

- Accurate training records are the responsibility of the operator
- Training records are maintained on the network Share Point Site

11. PERSONNEL COVERAGE

JACOBS employs licensed operators, all of whom are required to hold certificates for water treatment and/or water distribution.

JACOBS provides sufficient daily coverage, as per each Operations and Maintenance contract, typically from 07:00-15:30. Off-hours on-call coverage is also provided 24 hours a day.

On-Call Coverage

- Off hours emergencies are addressed by the designated on-call operator
- The on-call schedule is typically set by the project manager, or designate
- The on-call schedule is communicated verbally or posted at a central location and also on the Sharepoint.
- Typical on-call emergencies can be handled by the sole on-call operator
- The Overall Responsible Operator (ORO) is Peter Mennen.

Water systems are monitored by an alarm system, which notifies the operator when alarm conditions are encountered. Each alarm must be acknowledged by an operator otherwise another operator will be contacted. This will continue until the alarm has been acknowledged. Operators respond to alarm conditions, to investigate and rectify any outstanding issues. Conservative alarm set points plus multiple monitoring and treatment barriers are in place to reduce risk to public health.

If circumstances arise where additional staff is required, assistance can be requested from any of the other off-duty licensed operators.

Refer to: **PROCEDURE C**

12. COMMUNICATION

This procedure describes the communication of QMS issues amongst Operating Authority staff (internal), the water system Owners (external), Suppliers (external)

and the public (external).

Communication with the Owner:

- Management review meetings (as per Procedure F, Management Review Procedure)
- Regular administration meetings, including maintenance and operations reports submitted as per operations contract between Owner and OA
- Informal meetings (direct telephone contact, e-mail, site visits)

Communication with Personnel:

- Monthly safety meetings
- Postings are listed at the water department
- Review of Operator's Log Book (by Operations staff)
- Informal meetings (informal discussions, e-mail, memos, phone contact)
- Regulatory and legislative changes (staff are emailed to ensure applicable changes are reviewed)

Communication with Suppliers:

- Written and verbal commitments related to purchasing (purchase orders)
- Verbally communicated to suppliers directly from Operators
- Essential Supplier/Contractor letter of notification
- Consider communicating with our essential suppliers of Top Management changes related to drinking water

Communication with Public:

- Accept phone inquiries, complaints, and concerns from the public
- Any inquiry/complaint that comes to the OA is recorded on a Compliant form and is dealt with as necessary
- Annual compliance reports may be posted on Owner's website
- Notification of water system emergencies and alerts
- Press releases as required (issued by the Owner)
- All public documents are made available to the public upon request to the Owner
- Public information posted as required at municipally-owned buildings

The QMS representative shall ensure the owner (Mayor and Council) has access to a copy of the Operational Plan. The QMS representative shall keep the owner informed of any changes to the QMS, the adequacy of infrastructure requirements, the outcome of management reviews and other issues about the QMS through regular council meetings. Minutes of these meetings are maintained and filed within the Township office.

Personnel will be informed of the QMS and of any changes or updates to it through staff meetings with the QMS representative. A current version of the Operational Plan is available for review by staff at the Township office and the Lucan Booster Station.

Essential suppliers shall receive information regarding the QMS from the QMS Representative or Water Supervisor if and when necessary. Consider communicating with our essential suppliers of Top Management changes related to drinking water.

Consumers will be informed of the QMS and any significant changes by a notice posted on the Township's web site or the distribution of a newsletter/flyer.

The QMS policy will be posted at the Township Office, Lucan Water Station and Granton Water Station. It can also be viewed digitally on the municipal web site.

13. ESSENTIAL SUPPLIERS AND SERVICES

This procedure identifies the supplies and services that are deemed essential to the delivery of safe drinking water and how the suppliers ensure the quality of these essential supplies and services.

Where applicable supplies and process chemicals must meet AWWA standards or adhere to a standard that is an equivalent. Supplies must be verified against the order requisition upon being received. Proof of chemical products must also be provided to the operator upon delivery and prior to being unloaded. All testing conducted at laboratories must be conducted by laboratories that are accredited to conduct such tests.

Where a supplier comes onsite to perform different types of services that directly affect the quality of water (ie: calibration on continuous monitoring equipment, etc) they must provide a license or a certificate of accreditation before work is performed.

A list of suppliers and contractors has been developed and is in the Township office. This list is reviewed annually by the QMS Representative to ensure that it is current and up to date. Any suppliers that have provided inadequate service are replaced as required.

Refer to: **ANNEX G**

Monitor suppliers services by conducting an annual supplier review to be completed as per the audit schedule. Some items to address during the review include:

- Ask them to provide licenses or certificates to ensure they are working legally
- Ensure they have proper insurance (if applicable)

-If there is a certain safety risk ensure they have the proper training (i.e. fall protection, confined space)

14. REVIEW AND PROVISION OF INFRASTRUCTURE

This element defines the process used by JACOBS to review the adequacy of the infrastructure and resources necessary to operate and maintain the drinking water system safely and effectively. This procedure ensures periodic evaluation of the condition and capacity of infrastructure components. The results of the evaluation are used to prioritize future resource allocation.

- The need for infrastructure will be communicated to the Owner on an as-needed basis
- Communication methods can include verbal, e-mail and system summary reports
- The QMS Representative and the Public Works Manager will meet on an annual basis tour all the facilities within the Lucan Biddulph Drinking Water Systems to determine that the proper infrastructure is in place to operate and maintain the subject systems. They shall consider MOE Compliance Inspection Reports, flow data trends, water quality reports and maintenance records to determine priority needs.
- Operating Authority will communicate with the Owner on an annual basis the results of the review to ensure that the adequate infrastructure needs are met and that the proper funding is available.
- Outcomes of the risk-assessment documented under Element 8 to be considered when reviewing adequacy of the infrastructure necessary to operate and maintain the drinking water system.

Projects are identified on a 5 year budget forecast through the asset management report with details provided to Council. The asset management report is undated annually by the Township.

15. INFRASTRUCTURE MAINTENANCE, REHABILITATION AND RENEWAL

The Project Manager or QMS Representative will keep the summary of the Operating Authority's infrastructure maintenance, rehabilitation and renewal programs current. Also, the Operating Authority will monitor the effectiveness of the maintenance program and communicate this to the owner. As the review process is completed, an action plan for funding and work structures shall be implemented.

Planned Maintenance: Planned maintenance is scheduled by the OA. Scheduled tasks are typically

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defined by manufacturer's literature when available and revised (or created) as needed according to operator experience/observations. Planned maintenance tasks are communicated by OA to Owner, sometimes prior to maintenance completion and sometimes after. Completed tasks are recorded on Maintenance Connect and CityWide and in the Operator's Log book where applicable.

Unplanned Maintenance: Unplanned maintenance tasks result from equipment malfunction or breakage.

Major (usually based on a preset dollar value mutually agreed upon by Owner and OA) unplanned maintenance is authorized by the Owner, the Project Manager, the ORO or OIC of the affected facility. Minor unplanned maintenance can be performed without the consent of the Owner, but notification is made to the Owner as quickly as possible. The OIC typically responds to unplanned maintenance during normal working hours while the on-call operator responds during off-hours. Documentation of unplanned maintenance tasks is recorded in the logbooks.

Measures to prepare for and expedite unplanned maintenance include equipment redundancy (back-up units), spare parts inventory, as well as documented repair and safety procedures.

Rehabilitation/Renewal/Capital Upgrades: Replacement of aging fixed heavy equipment, as well as upgrades, expansions, and in-ground systems improvements are planned by the Owner, in discussion with the operations staff and the Project Manager. All major expenses require approval from the Owner as per the O&M contract. Documentation shall be in place to communicate long term forecast of major maintenance, rehabilitation and renewal activities.

16. SAMPLING, TESTING AND MONITORING

There is one (1) continuous chlorine residual analyzer located in the Lucan Water Station and two (2) continuous chlorine analyzers located in the Granton Water Station. In the case of the Lucan Water Station, the analyzer monitors the free chlorine residual of the water as it leaves the station. In Granton the chlorine is monitored as it enters the station and as it leaves, after being re-chlorinated if necessary. In addition to these analyzers, the township has two (2) handheld chlorine analyzers which are used to perform distribution testing and to check the continuous analyzers. One pH meter is maintained in the township and used for lead testing. Air monitoring kits for confined spaces are kept at the Lucan Public Works Facility. Free chlorine levels are checked daily at the water stations and at key locations within the distribution system.

Sterile sample bottles are received from the laboratories and qualified operators are required to take courses as to the proper procedures for collecting the samples.

Relevant sampling, testing and monitoring is done upstream by LHPWSS. They ensure that the water supplied meets the Ontario Drinking Water Quality Standards (ODWQS) and has a minimum Free Chlorine Residual of 0.20 mg/L. LHPWSS has on-line chlorine residual analyzers on the treated water leaving the plant and also downstream in London.

Six (6) water samples are taken from various locations throughout the township weekly and tested at the accredited SGS Environmental Services laboratory in London. Each Sample is tested for e-coli, total coliform and two of the six are tested for HPC. SGS Environmental Services also conducts our testing for Trihalomethanes, Halo Acetic Acids (HAA's) and lead. The chlorine levels are checked manually by the operator at these sites when the microbiological samples are taken. Results of testing from the labs are stored in two (2) locations, one being a paper printout stored chronologically in a "Water Sampling Results" binder and the other being electronically on the server.

The laboratory will orally notify the Township immediately following any adverse readings. We in turn will orally notify and record the name of the local Medical Officer of Health and the MOE Spills Action Centre person whom was spoken to. Within twenty-four hours of this notification the lab will send Section 1 of the "Notice of Adverse Test Results" to us. We will in turn complete Section 2 (a) indicating the corrective action to be taken by the Municipality. These forms will be faxed or emailed to the Medical Officer of Health and MOE Spills Action Centre.

Once the sample has been re-tested and the results received, Section 2 (b) will be completed and sent to the Medical Officer of Health and the MOE Spills Action Centre.

These papers will then be filed in a properly labeled folder in a file cabinet and retained as per regulations.

The annual report will show the number and range of all tests performed in the system and any adverse readings and will be available to the owners and public.

Refer to: **Procedure D**

17. MEASUREMENT AND RECORDING

Operations staff shall ensure that all calibration and maintenance for all equipment is performed at the required frequency.

This procedure is applicable to the following types of equipment in use at facilities operated by

JACOBS:

- o Continuous chlorine residual analyzers
 - o Portable colorimeters (handhelds)
 - o Flow meters
 - o pH meters
- Calibration records for on-line chlorine analyzers are recorded on a spreadsheet located at both booster stations.
- A qualified staff member or contractor will ensure the proper calibration of the equipment.
- The frequency of calibration shall be at least that which is required by O. Reg. 170/03, or according to manufacturer's recommendations, whichever is more often.
- All calibration and maintenance shall be performed according to manufacturer's instructions
- All third-party flow meter calibration reports shall be filed in the designated area at the Lucan Booster Station.

18. EMERGENCY MANAGEMENT

It is understood that situations will arise that require Emergency Management. These situations may include but are not limited to loss of power, contamination, line breaks or interruptions in pressure. The Risk Assessment chart contained in the QMS Operational Plan can be referenced to for emergency procedures or contingency plans.

The Township of Lucan Biddulph has an emergency plan in accordance with the prevailing legislation and regulations which are updated annually and kept at the township office. Contingency Plan must be practiced and reviewed at least once each calendar year as outlined by Emergency Management Ontario (EMO). As part of the LBWDS operation and maintenance manual a 24/7 Operational Procedure is in place for the water distribution system at the Township office. Included in the manual is a list of emergency contacts as well as a list of essential suppliers and service providers.

The emergency contacts and essential suppliers and services list will be kept current by the QMS Representative.

The responsibilities of all positions within the municipality during an emergency are listed in the Municipal Emergency Plan.

If there is a water problem after hours, the resident will call the Township office and follow the prompts. The call will be directed to the person on call and the problem will be investigated promptly.

Desk top simulations will be practiced annually to keep Township Staff up to date on the emergency procedures.

Refer to: **Township of Lucan Biddulph Emergency Plan**

Refer to: **Lucan Biddulph Water Distribution System Operation and Maintenance Manual**

Refer to: Annual Mock Emergency Documents located on the Lucan Sharepoint site.

Water Distribution Operators attend numerous training courses throughout the year to ensure that they meet at least the minimum number of CEU's required to maintain their licenses. These training courses vary in topics from how to repair main breaks, detect leaks, and to limit the chances of contamination within the water distribution system. The courses that the operators attend, although not mock situations of real disasters and not testing response time, do help to ensure preparedness in the event of an emergency situation. A list of each operator's current training records can be found on the operating authorities sharepoint site.

19. INTERNAL AUDIT

Internal Audits shall be performed using the MOE's Internal Audit Checklist from the current version of "Implementing Quality Management: A Guide to for Ontario's Drinking Water Systems", every twelve (12) months. The audit date shall be determined between the QMS representative and the internal auditor. Written record of audit shall be distributed to all top management members.

Refer to: **PROCEDURE E**

Refer to: **"Implementing Quality Management: A Guide for Ontario's Drinking Water Systems" – Internal Audit Checklist**, found using the following link:

http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_086773.pdf

20. MANAGEMENT REVIEW

A management review will be completed every 12 months by top management in order to evaluate the continually suitability, adequacy and effectiveness of the QMS, as well as the Operational Plan currency, content and updates.

Refer to: **PROCEDURE F**

21. CONTINUAL IMPROVEMENT

JACOBS, along with the Township of Lucan Biddulph shall strive to continually improve the effectiveness of its Quality Management System through the use of corrective actions from the annual audits and management review.

Corrective Actions, Preventative Actions and Best Management Practices are recorded on the Corrective Action Spreadsheet. Sources may include:

- Internal Audits
- External Audits
- Staff reviews
- MECP inspection reports
- Consumer feedback
- Risk assessment outcomes
- Training sessions
- Management reviews
- Best management practices published by the MECP
- Corrective Action Spreadsheet

The corrective action spreadsheet is reviewed/observed during internal audits, QMS meetings and document reviews (ex. Ops plan review) to ensure actions are being implemented.

ANNEX B

COUNCIL ENDORSEMENT

DATE:

RESOLUTION NO. 2025-239

MOVED BY:

SECONDED BY:

That the Council of the Township of Lucan Biddulph approves the endorsement of the updated DRINKING WATER QUALITY MANAGEMENT STANDARD OPERATIONAL PLAN (DWQMS) 2.0 as presented by Jacobs on October 7, 2025.

Resolution Carried.

Cathy Burghardt-Jesson
Mayor Endorsement

A handwritten signature in cursive script, appearing to read 'Cathy Burghardt-Jesson', is written over a horizontal line.

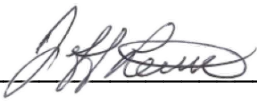
ANNEX C

MANAGEMENT ENDORSEMENT

This Drinking Water Quality Management Standard Operational Plan (DWQMS OP) has been reviewed and approved by the Township of Lucan Biddulph and the Operating Authority JACOBS. The purpose of this document is for planning, operation, and maintenance of the Lucan Biddulph Water Distribution System. A review by the Council / Mayor (Municipal Owner)(Annex B), Public Works Manager, Top Management, and Operational Staff will keep the DWQMS OP up to date and promote continual improvement. All recommended changes are to be approved by Council resolution.

Date : October 8, 2025

Endorsed By :

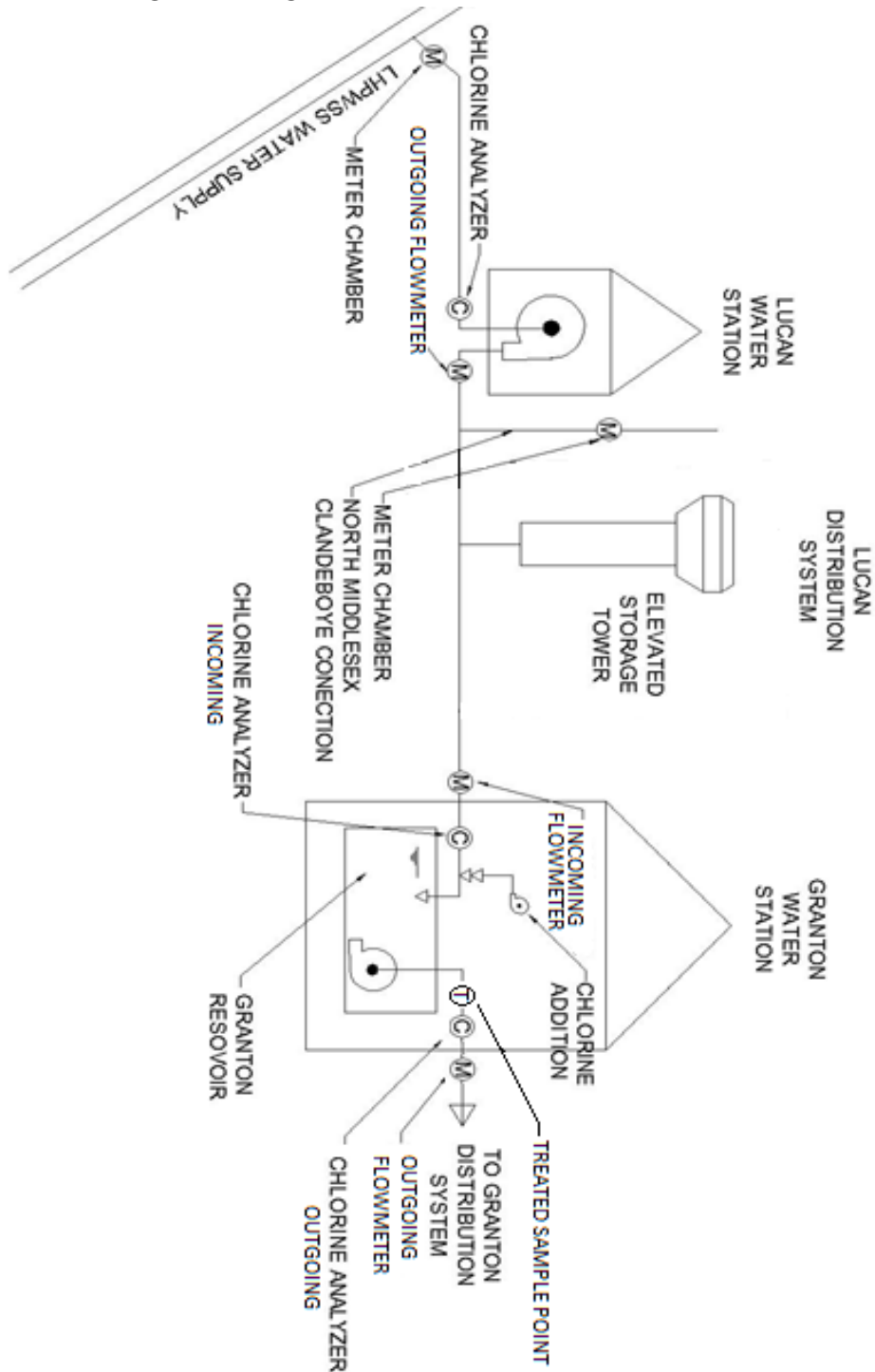


Jeff Little
Public Works Manager
Owner

James Knechtel
Jacobs – Project Manager
(Operating Authority) Top Management

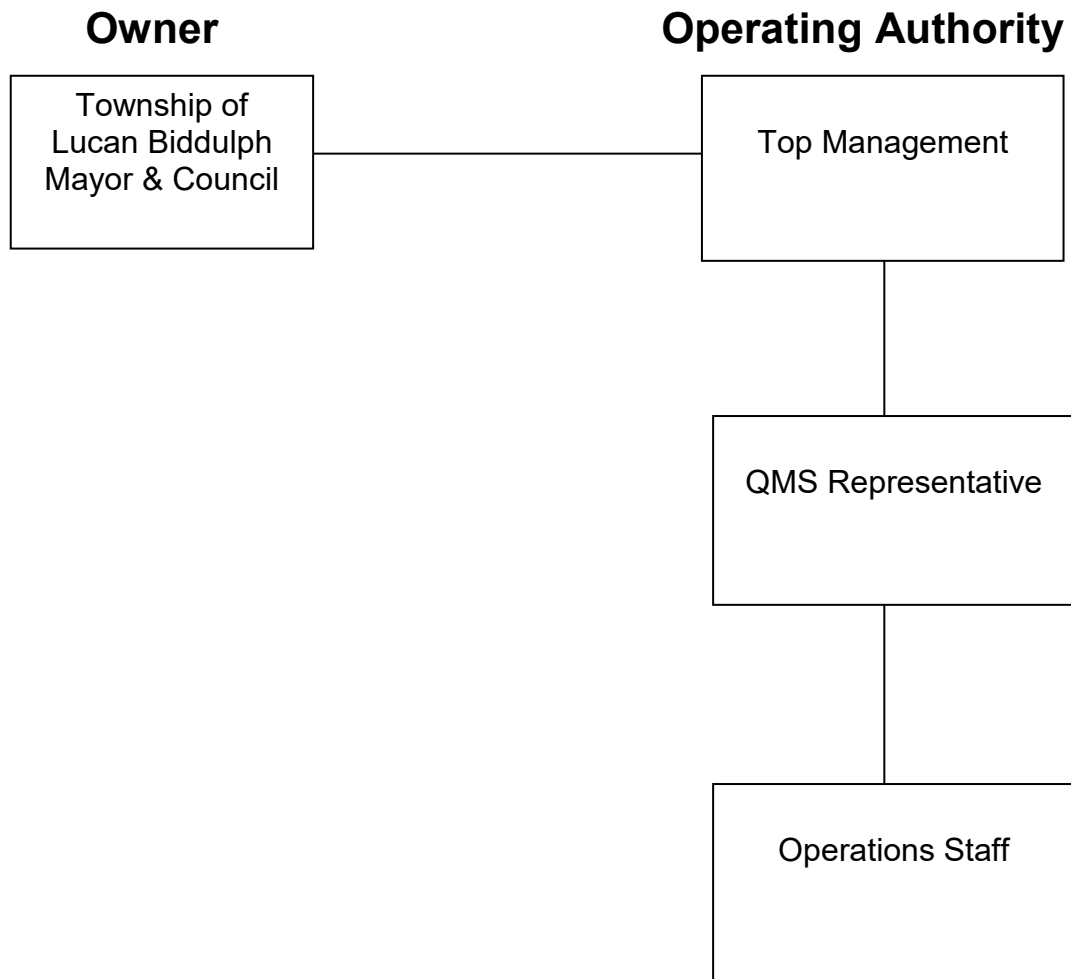
ANNEX D

SYSTEM SCHEMATIC TABLE



ANNEX E

ORGANIZATIONAL CHART



ANNEX F

Roles and Responsibilities Chart

Role	Responsibilities	Authorities
Owner	• Supply clean drinking water to the public • Ensure Water Systems are properly operated • Prescribe requirements and monitor the operation of the Water Systems, as per the Contract between the Operating Authority and the Owner • Represent the Water Systems to the public • Provide resources or infrastructure as necessary • Endorsing the Operational Plan for the Drinking Water Systems.	• Provide for management or delegated management of utility assets • Review, revise and approve proposed and existing bylaws, expenditures, user fees, and taxation rates • Provide / review / approve administrative policy direction • To prescribe requirements and monitor operations, as per the operating Contract • To provide resources as per the operating Contract • To provide resources to ensure the proper implementation and continuance of the QMS, including access to personnel, access to equipment, and financial resources
Operating Authority (OA)	• Operate the Drinking Water Systems • Perform the operations as per the Contract between the OA and the Owner	• To perform its required operative duties as per the Operating Contract

	• Obtain resources or infrastructure as necessary • Responsible for endorsing the QMS for the Drinking Water Systems • Undertaking the development, maintenance and Management Review of the QMS. OA to communicate audit outcomes to owner during Management Review	• To recommend improvements or changes, as per the operating Contract • To implement improvements or changes, as per the operating Contract • To provide resources as per the operating Contract
OA – Top Management	• Participate in Management Reviews of the QMS • Respond to Owners requests as required • Communicating with the Owner, the public, regulatory authorities on behalf of the OA • Ensure DWQMS requirements are met in the	• To recommend improvements or changes, as per the operating Contract • To provide resources as per the operating Contract
OA – QMS Representative (reports to Top Management)	• Establish, implement and maintain the QMS in accordance with the Drinking Water Quality Management Standard • Communicate the status, progress and need for improvement of the QMS to Top Management • Arrange, chair and provide necessary information to Top Management for the Management Review • Report the performance of the QMS to Top Management • Respond to Owner's requests as required • Represent the OA to internal or external parties with regards to the QMS including any external environmental communications • Review/approve relevant QMS documents, applications, etc. and ensure that the most current versions of documents required by the QMS are being used at all times • Ensure that personnel are aware of all current regulatory requirements that pertain to their duties with the operation of the drinking water system • Schedule Operators • Promote awareness and effectiveness of the QMS throughout the operating authority	• To perform all defined responsibilities under the QMS • May assign a designate to perform any of the listed responsibilities

	• Identify the need for resources or infrastructure • May assign a designate to complete duties in his/her absence • Report and act upon non-conformances	
OA – Operations personnel (report to Project Manager)	• Carry out applicable QMS tasks • Plan and manage operations, and perform maintenance tasks for the water systems • Report and act upon non-conformances • Follow procedures, complete forms • File records • Laboratory sampling • Attend training • Receive external complaints and communicate them to the QMS Representative • Regularly communicate to the QMS Representative • Carry out required operations and maintenance activities • Back up ORO • Operators must maintain licenses	• To perform the required QMS duties

Annex G

PRODUCT/SERVICE	SUPPLIER
Chemicals	Anchem Sales 120 Stomach Crescent London, Ontario N5V 3A1 Phone: (519) 451-1614 Fax: (519) 451-4593 Toll Free: (800) 387-9799 Jutzi Chemicals Ltd P.O Box 280 279 Lorne Ave Stratford, ON 519-271-9831
Chemical Pumps & Analyzers	Metcon Sales & Engineering Ltd. 15 Connie Crescent Unit 3 Concord, Ontario L4K 1L3 Phone: (905) 738-2355 Fax: (905) 738-5520 Pierce Services PO Box 26027 Guelph, Ontario N1E 6W1 Phone: (519) 820- 4853 Fax: (519) 824-9402
Equipment Rentals	A & B Rental 1579 Fans awe Park Road West London, Ontario N6H 5L3 Phone: (519) 471-7470 Fax: (519) 471-9506 Country Corners Rent-All Inc. 586 Main Street Exeter, Ontario N0M 1S1 Phone: (519) 235-3456
General Contractors	C T Environmental Ltd. 73595 Goshen Line RR 2 Zurich, Ontario N0M 2T0 Phone: (519) 236-7401 Fax: (519) 236-4147 Toll Free: (877) 336-7401 Clarence Carter & Sons 35031 Richmond Street Lucan, Ontario N0M 2J0 Phone: (519) 227-4217 Fax: (519) 227-4224 Wayne Hodgins

	Lucan, Ontario NOM 2J0 Cell: (519) 808-9609 Home: (519) 227-4254
Generator Service	Gencare Services Ltd. 347 Sovereign Road London, Ontario N6M 1A6 Phone: (519) 659-7118 Fax: (519) 451-1707
Hardware Supply	Langford Lumber Home Building Centre - Lucan 6255 William Street Lucan, Ontario NOM 2J0 Phone: (519) 227-4416 Scott's Elevator Ltd. 6244 William Street Lucan, Ontario N 0M 2J0 Phone: (519) 227-4479
Portable Instrumentation	Hach 400 Britannia Road East Unit 1 Mississauga, Ontario L4Z 1X9 Phone: (800) 665-7635 Fax: (866) 259-0984 Hetek Solutions Inc. 2085 Piper Lane London, Ontario N5V 3S5 Phone: (519) 659-1144 Fax: (519) 453-2182 Toll Free: (888) 432-8422
Online Instrumentation and SCADA and Communications	Pierce Services PO Box 26027 Guelph, Ontario N1E 6W1 Phone: (519) 820- 4853 Fax: (519) 824-9402 Eramosa Engineering Inc. 4096 Meadowbrook Dr., Suite 112 : London, ON : N6L 1E3 Manishchandar Sundaravel System Integrator Direct: 226.777.8236 : Office: 519.266.6994 : Cell: 226.203.0097 Selecta Inc. Morning ton Ave. Stratford, Ontario N5A 6S2

	Phone: (519) 271- 0322 Fax: (519) 271-0532 Quadro Communications 280 Main St. Lucan, Ontario N0M 2J0 Phone: 1-(800)-265-4983 High Tech Controls 2469 Aviation Lane London, Ontario N5V 3Z9 Attn: Rick Beer Phone: (519) 659-2309 x225 Cell: (519) 317-2657
Trades	KL Electric 121 Francis Street Lucan, Ontario N0M 2J0 Phone: (519) 227-1059 Pym Electric Ltd. 6950 Egremont Drive RR 41 London, Ontario N6H 5L2 Phone: (519) 433-6044 Fax: (519) 433-1295 Rushton Plumbing 33267 Coursey Line RR 1 Lucan, Ontario N0M 2J0 Phone: (519) 227-4212 or (519) 521-3482 Selectra Inc. 925 Mornington Street Stratford, Ontario N5A 5H3 Phone: (519) 271-0322 Fax: (519) 271-0532
Valves & Fittings	Corix Water Products 4102 Eastgate Cres. London, Ontario N6L 1B2 Phone: (519) 652-5555 Fax: (519) 652-0545 Toll Free: (888) 866-8485 Emco Corporation 944 Laethorne Street London, Ontario N5Z 3M5 Phone: (519) 686-7340 Fax: (519) 686-607 Toll Free: (800) 265-4607 Evans Supply 338 Neptune Cres.

	London, Ontario N6M 1A1 Phone: (519) 453-6515 Fax: (519) 453-7756 Toll Free: (800) 268-8309 Wajax Industrial Components 2250 Argenta Road Mississauga, Ontario L5N 6A5 Phone: (226) 236-6613 Fax: 905.812.7203 Wolseley Canada Inc. Western Ontario District Phone: (226) 378-7156
Water Sample Testing	SGS Canada Inc. Environmental Services 657 Consortium Court London, Ontario N6E 2S8 Phone: (519) 672-4500 Fax: (519) 672-0361

PROCEDURE A

DOCUMENT AND RECORDS CONTROL

QMS Document Control (Other than Records)

This procedure is applicable to the following QMS documents to ensure:

- Operational Plan
- Procedures
- Audit Checklist – Appendix M: Internal Audit Checklist pages 229-240 from the MOE's "Implementing Quality Management: A Guide for Ontario's Drinking Water Systems" (July 2007) will be used and can be found through the following link:
http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_086773.pdf
- Forms
- Equipment Manuals

Creating New or Updating Existing Documents

- The need for document changes or for new documents or procedures may be identified through audits or management reviews. The Project Manager along with the QMS Representative will delegate the task of creating the new document.
- Any employee of the Water Department may request a change to an existing QMS. The request must be made in writing, dated and submitted to the QMS Rep. The request must include the following information:
 1. Reason for new or changed document – must belong in one or more of these categories:
 - Required by the DWQMS
 - Enhances process control
 - Reduces risk
 - Supports regulatory requirements
 - May improve operational efficiency
 2. Outline of document change or new document content
 - Narrative format is acceptable
- The requester shall develop the new/changed document and submit it to the Project Manager for approval.
- Document changes or the need for new documents or procedures may be identified through audits or management reviews.
- Sequential revision numbers and the date the revision was finalized shall be legible on all documents within in the Operational Plan.
- All changes and revision made to the Operational Plan will be documented and catalogued in the Operational Plan Revision Archive which will be maintained by the QMS Representative or Top Management in the absence of the QMS Representative.
- All changes to the Operational Plan will be reviewed with water department personnel to ensure compliance.

Approving and Disposal of Documents

- All QMS related documents shall be approved by the QMS Representative.
- The QMS Representative shall be responsible for ensuring that copies of the new or changed document show the revision number and date modified and are distributed.
- Obsolete documents (due to changes) shall be collected and destroyed by shredding

Reviewing Documents

- The Operational Plan and procedures shall be reviewed annually for applicability and relevance.

Document Availability

- All procedures, instructions, forms and checklists are retained in the QMS binders at the Lucan Booster Station.
- Original sets of equipment manuals and specifications are kept at the water department office, and appropriate copies are kept at the reservoirs and pumping stations.

DOCUMENT	ELECTRONIC FILE LOCATION	MASTER COPY LOCATION	COPY LOCATION(S)
Operational Plan	JACOBS Lucan Biddulph Sharepoint site	LBWDS file cabinet	n/a
Licenses & Certificates	n/a	Displayed at Lucan & Granton Water Stations	Digital copies kept at Jacobs Office (Seaforth)
Operations & Maintenance Manuals	n/a	Jacobs Office (Seaforth)	Lucan & Granton Water Stations
Blank Chain of Custody forms	JACOBS Lucan Biddulph Sharepoint site	LBWDS file Cabinet	n/a
Blank Log Sheets – Granton	JACOBS Lucan Biddulph Sharepoint site	LBWDS file cabinet	n/a
Blank Log Sheets – Lucan	JACOBS Lucan Biddulph Sharepoint site	LBWDS file cabinet	n/a

QMS Record Control

This procedure is applicable to all records that demonstrate conformance to DWQMS requirements. All records that demonstrate compliance are covered by Ontario Regulations 170/03 and 128/04.

All QMS records are retained for a minimum of 6 years. However, if a QMS record is also required of O. Reg. 128/04 and/or 170/03, then the retention time shall be as per the regulation. Once the record retention time has been reached, records shall be destroyed by shredding.

Manual Records

- The record title shall be clearly visible and legible
- Manual records shall be legible. Pencil or any other erasable marker shall not be used to record process or product information or data.
- QMS records shall be filed by type by date.
- QMS related water distribution records will be available at the water department office.

- QMS records shall be stored in such a manner as to prevent deterioration.
- All manual records shall show the name or initials of the recorder and the date (and time if appropriate) the record was generated.

SCADA Records

- Summaries are saved on the computers located at both the Lucan Water Station and the Granton Water Station.
- Summaries are also backed up on a separate hard drive located respectively at the Lucan and Granton Water Stations.

Records Availability

RECORD	ELECTRONIC FILE LOCATION	PAPER COPY LOCATION	RETENTION TIME	DISPOSAL METHOD
External Laboratory Tests Results	Lucan Sharepoint/Drinking Water Sampling/Laboratory Results/Year	Lucan Booster Station	15 years – O. Reg. 170/03 under SDWA 2002	Shred paper copies & Delete data files from server
Completed Operator Log Sheets	Lucan Sharepoint/Forms & Checksheets/Daily Benchsheets	LBWDS file cabinet	6 years – Section 28(6) O. Reg. 128/04 under SDWA 2002	Shred paper copies & Delete data files from server
Current year operator log sheets	n/a	Lucan & Granton Water Stations	6 years – Section 28(6) O. Reg. 128/04 under SDWA 2002	Shred paper copies & Delete data files from server
Training Records	Lucan Sharepoint/Training/Staff Training Log	Employee Personal Training file	6 Years – O. Reg. 128/04 under SDWA, 2002	Shred paper copies & Delete data files from server
Correspondence to home owners	F:\Water (under applicable file)	Home Owner property file in Vault at the Township Office	Indefinitely	n/a
SCADA Monitoring Records	n/a	Hard drive at the Lucan and Granton Water Station (Current). LBWDS file cabinet(past)	Indefinitely	n/a
Calibration Results	F:\Water\Operational Records	Water Binder – Township Office & LBWDS file cabinet at year end	6 years	Shred paper copies & Delete data files from server

Annual & Summary Reports	Lucan Sharepoint/Annual Reports/Year	LBWDS file cabinet	6 years – O. Reg. 170/03 under SDWA 2002	Shred paper copies & Delete data files from server
Management Reviews	Lucan Sharepoint/DWQMS/Management Review/Year	LBWDS file cabinet	6 years – O. Reg. 128/04 under SDWA, 2002	Shred paper copies & Delete data files from server
External Audit Report and CAR's	JACOBS Lucan Biddulph Sharepoint site/DWQMS folder	LBWDS file cabinet	6 years – O. Reg. 128/04 under SDWA, 2002	Shred paper copies & Delete data files from server
Internal Audit Report and CAR's	JACOBS Lucan Biddulph Sharepoint site/DWQMS folder	LBWDS file cabinet	6 years – O. Reg. 128/04 under SDWA, 2002	Shred paper copies & Delete data files from server
Operational Plan Revision Archive	n/a	LBWDS file cabinet	Indefinitely	n/a
Annual Emergency Exercise	n/a	LBWDS file cabinet	6 years	Shred paper copies & Delete data files from server
Generator Maintenance Records	n/a	LBWDS file cabinet and	6 years	Shred paper copies & Delete data files from server

PROCEDURE B

RISK ASSESSMENT AND OUTCOMES

JACOBS has established, implemented and maintains this procedure to determine what potential hazards and critical control points exist in the water distribution and supply system.

The Risk Assessment Team consists of the QMS Rep and Operations staff.

Once every twelve months, the QMS Rep will complete an assessment of the risk assessment and ensure that the information and assumptions remain current and valid.

Every 36 months, the QMS Rep will assemble a team to conduct a new risk assessment.

The process for hazard analysis includes an assessment of each process step and/or activity associated with the water system, and identification of hazards that are potentially present or possible at each process step and/or activity.

Once hazards are identified, the next step is the determination of critical control points (CCPs).

This process involved a risk assessment by prioritizing hazards and identifying points where control may be exerted to eliminate or minimize those hazards.

The risk assessment was performed by rating the likelihood, severity and detectability of each hazard at each relevant process step or activity on a scale of 1 to 5. The values for each of these factors were added together to give a risk priority number.

Level of Likelihood+ Severity+Detectability	Risk Category
3-5	Low
6-8	Moderate
9-15	High-CCP

Based on a review of the overall risk values and the associated events, a threshold number was chosen such that all events associated with risk values which were equivalent to or greater than the threshold number were considered critical. Those points where control could be exerted over the hazards which had risk values equivalent to or greater than the threshold number, were considered critical control points.

Likelihood is the probability/likelihood of a hazard or hazardous event occurring.

Severity is the potential impact to health or impact on operations if the risk is not controlled (assumes control measures do not work).

Detectability is a measure of the ability to detect the presence of certain hazards. Hazards which could be easily and quickly detected were given a low value. Hazards that are hard to detect or undetectable were given a high value. The risk becomes greater as appropriate responses cannot be taken to control or mitigate the risk.

The rating system is defined as:

DESCRIPTION	LIKELIHOOD OF HAZARDOUS EVENT OCCURRING	RATING
Rare	May occur in exceptional circumstances, and has not occurred in past	1
Unlikely	Could occur at some time, historically has occurred less than once every 5 – 10 years	2
Possible	Has occurred or may occur once or more per year	3
Likely	Has occurred or may occur on a monthly or quarterly basis	4
Very Likely	One or more occurrences on a monthly or more frequent basis	5

DESCRIPTION	SEVERITY OF HAZARDOUS EVEN OCCURRING	RATING
Insignificant	Insignificant impact, little public exposure, little or no health risk	1
Minor	Limited public exposure, minor health risk	2
Moderate	Minor public exposure, minor health risk	3
Major	Large population at risk	4
Catastrophic	Major impact for large population, complete failure of systems	5

DESCRIPTION	DETECTABILITY OF HAZARDOUS EVENT	RATING
Very Detectable	Easy to detect, visual	1
Moderately Detectable	Increased flow rates	2
Normally Detectable	Visually detectable but not on rounds or regular basis	3
Poorly Detectable	Visually detectable but not inspected on a regular basis	4
Undetectable	Cannot detect	5

Included in the following pages is a chart that identifies the process and activity hazards related to the water system that were identified, along with the outcome of the risk assessment, and the identification of which of these were identified as critical control points.

Critical control points that are identified are then further broken down in a second table (also below) which outlines critical control limits and response procedures.

Equipment such as pumps and motors are regularly checked and maintained by Operators. Chlorine analyzers are calibrated regularly by the Operators and, annually by the manufacturers' representative to maintain accuracy as per the manufacturers' guidelines. In the event of critical equipment breakdowns, spare components are stocked for replacement and/or repair. Trades are available for emergency repairs and after hour contact numbers are provided to operators to ensure consistency.

To ensure JACOBS commitment to the consumer to provide a consistent supply of safe, high quality drinking water, maintaining continuous uninterrupted power is the focus and a primary concern. Providing continuous operation under all foreseeable circumstances, such as power outages, equipment breakdown, etc., modern technology and regular maintenance enhances reliability. This includes standby power generation systems, UPS systems, fire detection, lightning protection, and central monitoring of major systems and applicable MOE requirements and guidelines.

Plants are also controlled, monitored and recorded by the Supervisory Control and Data Acquisition System (SCADA) to ensure the accurate operation and Recording of the Plant. Along with the SCADA system, both the Lucan Pumping Station and the Granton Pumping Station have their own log books. The log books are used by the operators to write down any deviations from normal operating conditions or any observations that he/she feels could lead to problems in the future and need addressed. All data from the system is also recorded on the hard drives located at the pumping stations, and data points (maximums, minimums, averages etc.) are reviewed in a summary chart daily. If an operator sees a data point that exceeds or falls below a critical control limit, they are to write it into the log book and follow any response procedures that are necessary. SCADA alarms also notify the operator in the case of adverse results, in which case the operator would write down why they were called into the pumping station. Data from the hard drives are also backed up onto an external hard drive located in each of the pumping stations, ensuring that all data is properly protected from a computer memory issue. Detailed procedures have been developed, and can be found in the water distribution system's standard operating procedures manual. This manual is located in both of the pumping stations.

In responding to these hazards/hazardous events, all details and deviations should be recorded in the system log book per O. Reg. 128/04 Activity or Process Statement	Description of Hazard	Potential Result of Hazard	Comments	Available Monitoring & Control Measures	Emergency Procedure or Contingency Plan	Likelihood	Severity	Detectability	Rank*	CCP?	CCP Comments
Source Water (supply LPHWSS)	Problem with Raw Water/Treatment	Chemical or Biological contamination of source water	No control Operated by Others	Daily chlorine residual in LWDS by LB Continual on-line analyzer in Lucan Water Station Notification by LHPWSS Continual on-line analyzer in Granton Water Station	Monitor residuals at furthest sampling points (Granton Water Station prior to re-chlorination & Granton Park Pavilion) Talk to LHPWSS operator; see if system chlorine residual has rebounded. Possibly issue boil water advisory and communication Communication essential with LHPWSS – dependant on levels/demands at other reservoirs and locations Contact Ministry's Spills Action Centre and Local Medical Officer of Health	1	5	3	9	Yes	SCADA alarms are triggered if free chlorine residual drops below set point and Emergency Procedure or Contingency Plans are activated See Response Procedure Table

Source Water (supply LPHWSS)	Source Water Supply Shortfall	Physical/ Climate Change	Operated by LPHWSS	Encourage water conservation, water is metered	Monitor Water consumption/flows on SCADA trending	1	5	2	8	No	No Control
Source Water (supply LPHWSS)	Chemical Spill impacting source water	Chemical and Biological Contamination	Operated by LPHWSS	Monitor water quality through sampling and general observation	LPHWSS Communication, Lab Results	1	4	3	8	No	No Control
General	Security	Cybersecurity	SCADA System	Loss of control over water system- Scada system serviced by Aeromosa	Keep scada room/office locked, and scada computer logged off. Resident complaints of loss of water/pressure or unusual water plant activities (pumps off when should be on etc.)	1	5	2	8	No	
Storage	Vandalism/ Terrorism	Chemical and Biological Contamination		Locked gates, hatches, doors Drive by visual checks every other day	Check chlorine residual, contact police, if necessary take elevated storage tower off-line, send sample to lab, flush system	1	3	2	6	No	No control

	Biofilm development and build up of sludge in tower/reservoir	Biological contamination Rapid deterioration of chlorine residual	Tower in Lucan Reservoir in Granton	Continuous monitoring on outgoing chlorine residual in Lucan and Granton Water Stations Camera inspections Re-disinfection procedures	Cleaning as per procedure	1	4	3	8	No	SCADA alarms are triggered if free chlorine residual drops below set point and Emergency Procedure or Contingency Plans are activated See Response Procedure Table
Pumping Facilities	Power Loss	Quantity/Quality		Standby Generator at Lucan Water Station with automatic transfer systems, PLC check and loop controller daily New Standby Generator at Granton Water Station with automatic transfer system Uninterrupted Power supply at elevated storage tower for PLC SCADA System on 2hr UPS SCADA Alarm to indicate power outage	Fuel supply for several days, fuel at other locations	3	2	1	6	No	No control
	Vandalism/Terrorism	Quantity – Chemical/Biological Contamination		Security Fences, locked gates, hatches Drive by visual checks during daily rounds	If pumping capacity lost reconfigure distribution system Call police	1	4	2	7	No	No control
	Failure of alarms and monitoring equipment, pumps (lightning)	Loss of SCADA Alarms		General alarm will be sent if communications are lost	Go to stations, override automatic, operate on manual	2	3	1	6	No	No control

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Distribution	Watermain Break within distribution system	Quantity/ Quality Low pressure Bacteriological or chemical contamination	No distribution system storage; need to pump continuously from the plant	Community complaints Low pressure or high flows, visual if at ground, no on-line indication, /monitoring of flows from plant (daily checks at station) May not be aware of fire/break Watermain replacement program based on material, age Mapping	Looping/twinning have improved ability to isolate areas and also maintain flow in event of breaks Repair; watermain disinfection procedures, training, AWWA standards Repair parts etc. stocked If necessary issue boil water advisory after consultation with MOH	3	3	2	8	No	No control See Boil Water Advisory Procedure if required.
	Loss of chlorine residual (secondary disinfection)	Biological contamination	Granton Only	Daily chlorine residual in LWDS by Lucan Biddulph Continual on-line analyzer in Granton Water Station	Flush the system; increase chlorine dosage and resample	2	4	3	9	Yes	SCADA alarms are triggered if free chlorine residual drops below set point and Emergency Procedure or Contingency Plans are activated See Response Procedure Table
	Sustained Pressure Loss	Biological contamination		Monitor Trending on SCADA, audible alarms. Backup generator available	On Call operator to respond to alarms	1	5	2	8	No	No Control
	Long term Impacts of Climate Change	Climate Change		Monitor environmental trending, historical events	Upper Thames Conservation Authority, and Ausable Bayfield Conservation Authority	1	1	5	7	No	No Control
	Extreme Weather (tornado, ice)	Climate Change	Loss of Electricity	Stand-by generator starts automatically, Monitor weather forecasts	Resident Complaints, SCADA Alarms, Weather Alerts	2	4	1	7	No	No Control
	Sustained Extreme temperatures	Climate Change		Monitor distribution Chlorine residuals, and SCADA Trending	Check chlorine residual	1	3	2	6	No	No Control

	Commissioning of new mains causing contamination Loss of pressure – watermain break, major fire	Biological contamination		Procedures for disinfection of new mains Water hammer, back flush contamination prevented by 2" double check	Check chlorine residual Discussions with MOE and MOH if elevated If necessary issue boil water advisory after consultation with MOH	1	3	2	6	No	No control
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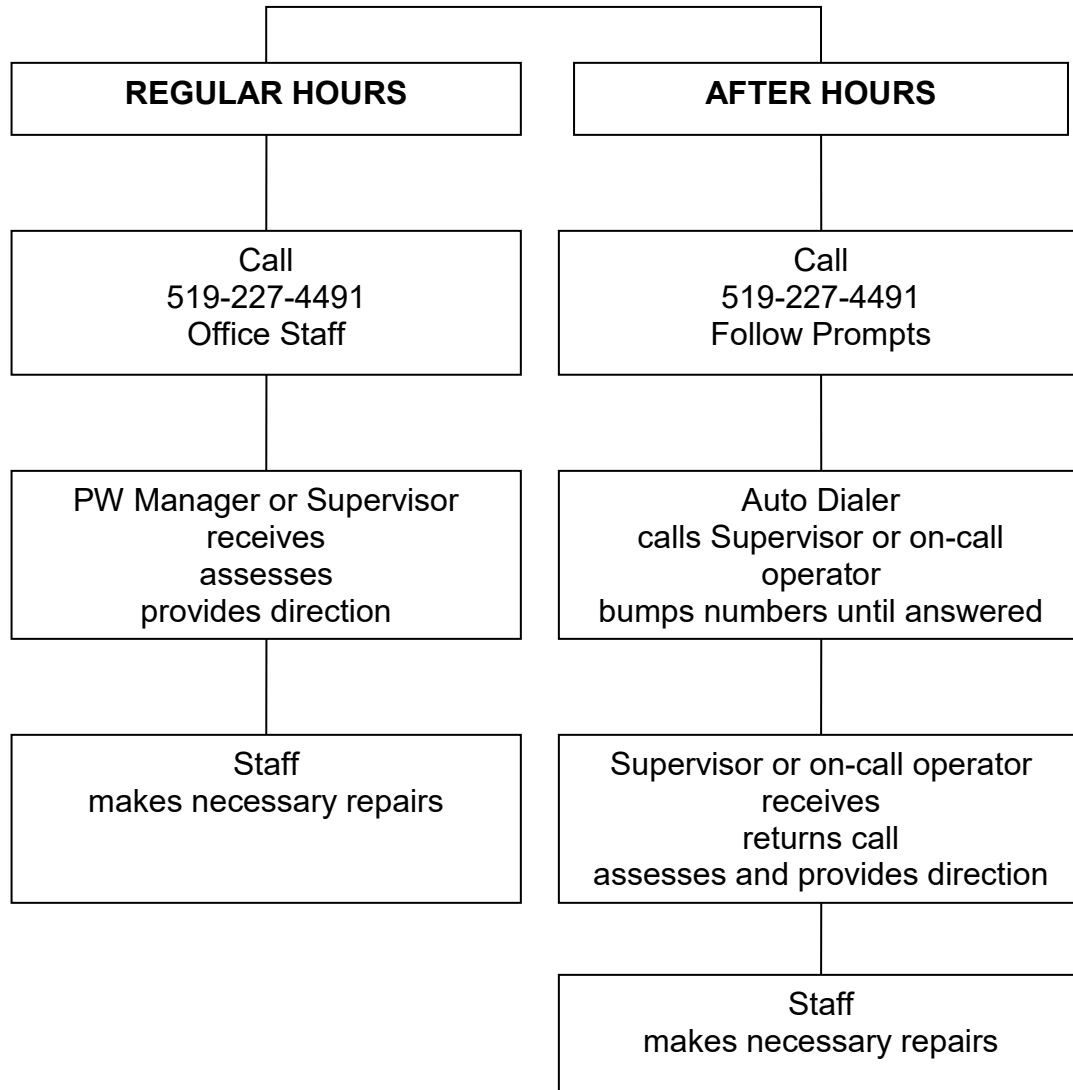
Distribution	Backflow from private plumbing (Cross connection)	Biological and chemical contamination		Visual All new meters are installed complete with Backflow (& PRV where required) (residential & commercial) New commercial/industrial uses are assessed to determine threat of backflow and the appropriate device is required prior to hook-up	Inspect homes/commercial properties in area, install backflow preventer, isolate area; Flush the system and resample; re-pressurize system Check chlorine residual Discussions with MOE and MOH Flush the system; Increase chlorine dosage and resample If necessary issue boil water advisory after consultation with MOH	1	2	3	6	No	
	Biofilms	Quality		Visual inspection of pipe breaks, reduced flow in pipes, inability to maintain chlorine residual Flushing	Replacement of old watermains based on material, age, observations Mapping	2	2	1	5	No	

Activity or Process Step	Description of Hazardous Event/Hazard	Critical Control Limits	Monitoring Processes and/or Procedures	Response Procedures (Detailed procedures are also required)
Source Water (supply LPHWSS)	Problem with Raw Water/Treatment	Free Chlorine Residual drops below 0.05mg/L Visual observations of water quality deterioration Taste and Odor complaints Loss of Chlorine residual downstream of tower in Lucan Loss of Chlorine residual	Continual on-line analyzer in Lucan Station SCADA alarm if chlorine drops below set point Scada continuously logs all data points, backs up data on computer hard drive and external hard drive (Lucan Booster) Data analyzed daily	If loss of chlorine detected in Lucan water station, contact LHPWSS. Consider closing supply valve until LPHWSS is able to restore chlorine residual Issue boil water advisory if LPHWSS is unable to restore residual in a reasonable amount of time Contact Local Medical Officer of Health and MOE Spills Action Control Centre if adverse water quality alarm
Distribution	Loss of chlorine residual (secondary disinfection)	Free Chlorine Residual drops below 0.05mg/L Visual observations of water quality deterioration Taste and Odor complaints Loss of Chlorine residual downstream of tower in Lucan Loss of Chlorine residual	Daily monitoring of chlorine residuals in Lucan Distribution system Continual on-line analyzer in Lucan Station Continual on-line analyzer in Granton Water Station SCADA alarm if chlorine drops below set point Scada continually logs all data points, backs up data on computer hard drives and external drives (Granton and Lucan Stations) Data analyzed daily	If loss of chlorine detected in Lucan water station, contact LHPWSS If chlorine loss detected in Granton, increase dosage rate on outgoing chlorine feed pump Contact Local Medical Officer of Health and MOE Spills Action Control Centre if adverse water quality alarm

Note: New Risk Assessment Completed- Re-assessed September 2022.
2023 – Annual Review
2024 – Annual Review
2025 – Re-assessment

PROCEDURE C

24/7 PERSONNEL COVERAGE



Procedure D

Lucan Biddulph Water System Sampling Protocol

Microbial

Frequency

- Microbial Samples are to be taken **Weekly**
- Typically samples will be taken, and delivered to the lab on Tuesday of each week, with results being returned on Friday.

Number of Samples

- Six (6) samples are to be taken from different locations.

Location of Samples

- The following locations are typical sample locations for microbial samples:
 - Lucan Booster Station
 - Granton Booster Station
 - Scott's Elevator (Lucan)
 - Lucan fire hall
 - Township office\shop
 - Granton Lions Hall
 - Andersons/Thompsons Elevators
 - Langford Lumber
- The following are considered acceptable alternate locations:
 - Granton Fire Hall
 - Lucan Arena
 - Lucan Scout Hall

Test Parameters

- The following tests shall be conducted for each Microbial sample collected:
 - Total Coliform (CFU/100ml)
 - E. Coli (CFU/100ml)
 - HPC (CFU/1ml) (only 2 per week)

Notes

- Operator to ensure the following parameters are recorded at the time of sampling:
 - Free Chlorine

Chlorine Residual

Frequency

- Chlorine Residuals are observed **Daily**

- Readings shall be recorded on the daily log sheets for both Granton and Lucan

Number of Tests/Observations

- Two Tests/Observations each for both Lucan and Granton shall be taken

Location of Tests/Observations

- One Test/Observations shall be taken at the following locations:
 - Lucan Booster Station
 - Granton Booster Station
- One additional test/observation shall be taken in both Lucan and Granton at any of the following locations:
 - Township office/shop
 - Lucan Arena
 - Lucan Scout Hall
 - Lucan Fire Hall
 - Lucan Pollution Control Plant
 - Granton Lions Hall
 - Granton Fire Hall
 - Other areas of the distribution system as available.

Test Parameters

- The following Test shall be conducted for each chlorine sample taken:
 - Free Chlorine (mg/l)

Trihalomethanes (THM's)/ HaloAcetic Acids (HAA's)

Frequency

- THM and HAA Samples are to be taken **Quarterly**

Number of Samples

- Two (2) samples are to be taken at two (2) different locations.

Location of Samples

- The following locations are typical sample locations for Trihalomethane samples:
 - Township Shop, 34363 Saintsbury Line Lucan
 - Lions Hall, Granton
- The following location is the typical sample location for HaloAcetic Acids samples:
 - Sylvite Agri Services- 695 Levitt St.

Test Parameters

- The following tests shall be conducted for each Trihalomethane sample collected:
 - Trihalomethanes (ug/l)
 - Bromodichloromethane (ug/l)

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- Bromoform (ug/l)
- Chloroform (ug/l)
- Dibromochloromethane (ug/l)

Notes

- Operator to ensure the following parameters are recorded at the time of sampling:
 - Free Chlorine

Lead

Frequency

- Lead samples shall be taken semi-annually (twice a year) as follows:
 - One sample between December 15th and April 15th of the following year
 - One sample between June 15th and October 15th

Number of Samples

- A total of twenty six (26) samples shall be taken in each testing period (twice a year) as follows:
 - Twenty (20) residential samples (2 samples at each location)
 - Two (2) non-residential samples (2 samples at each location)
 - Four (4) distribution samples
- While following a reduced sampling schedule, a total of thirteen (13) samples shall be taken in each testing period (semi-annual testing every three years) as follows:
 - Ten (10) residential samples (2 samples at each location)
 - One (1) non-residential sample (2 samples at the location)
 - Two (2) distribution samples

Location of Samples

- Residential and non-residential sample locations shall be confirmed prior to undertaking the samples based on receiving permission from homeowners/business owners to obtain the sample.
- Distribution samples shall be taken at a fire hydrant in close proximity to the residential samples being taken.

Test Parameters

- The following tests shall be conducted for each Sample collected:
 - Lead (ug/l)
 - pH (at time of sampling)
 - Total Alkalinity (distribution samples only)

PROCEDURE E

INTERNAL AUDIT

Internal audits are conducted to evaluate conformity of the QMS with the requirements of the Ministry of the Environment's Drinking Water Quality Management Standard.

Audits Conducted by JACOBS

Auditors

- All internal auditors must have successfully completed a recognized 16 hour Internal Auditor workshop

Internal Audit Schedule

- Internal audits are scheduled throughout the year.
- The audit schedule is developed and maintained by the QMS Representative.
- Each element of the Standard is audited at least once every calendar year.

Audit Planning

- The auditor shall review all related QMS documentation and obtain the current version of the DWQMS checklist at least one week prior to the audit.

Audit Checklists

- Performance of audits shall be documented by the auditors using the Audit Checklist, or a suitable alternative

Conducting the Audit

- The auditor shall observe activities, review records and interview personnel as necessary to ensure that the status of the audited element of the QMS has been effectively covered.
- The auditor shall review the results of previous audits to ensure any non-conformances are being rectified and continual improvements are being made.

Reporting the Results

- The auditor shall submit a completed checklist and report to the QMS Representative.

- The report shall include any requirement for corrective actions to address gaps between DWQMS and how the QMS is written and implemented.
- Corrective actions shall be communicated to the responsible individual and included as part of Management Review input.

Refer to Directors Direction; “Minimum Requirements for Operational Plans” – Element

Preventative Action

A preventative action is an action to prevent the occurrence of a non-conformity of the QMS with the requirements of the DWQMS or other undesirable situations.

If a Preventive Action is identified within the Operational Plan, it shall be recorded in the Corrective Action Spreadsheet under the Preventative Action/Best Management Practices tab and labelled “PA”. Once the PA is completed, a completion date shall be identified with supporting evidence.

PROCEDURE F

MANAGEMENT REVIEW

This procedure defines the Management Review process to ensure the continuing suitability, adequacy and effectiveness of the QMS.

Review Frequency

All of the review items (see below) shall be covered at least annually but can be covered more frequently due to changes in legislation, circumstances, or at the request of Top Management

Review Participants

The management review is convened by the QMS Rep. Attendees shall include the Public Works Manager, Top Management, and operations staff.

Review Items

The QMS Representative shall provide information and data concerning the following categories, for the review:

- Incidents or regulatory non-compliance
- Incidents of adverse drinking water tests
- Deviations from identified critical control limits and actions taken
- The effectiveness of the risk assessment process
- Results of internal and 3rd party audits
- Results of relevant emergency response testing
- Operational performance and water quality trends
- Follow-up action items from previous management reviews
- Status of action items (if any) identified between management reviews
- Change in resource requirements, infrastructure, process, personnel, DWQMS or regulations that could affect the QMS
- Consumer feedback
- The resources needed to maintain the QMS
- The results of the infrastructure review
- Operational Plan currency, content and updates
- Staff suggestions

Review Process

- The Management Review shall be a planned event. A minimum of one hour shall be set aside by the participants to ensure a thorough review of the QMS is conducted.
- Each input category shall be reviewed in order to identify if, where and when improvements to the QMS and its procedures are required.
- The QMS Representative or designate shall make note of any changes or action items required during the course of the review.

Review Output

- A list of changes required to be made to procedures or other QMS based documentation, processes, and amendments must be made within 30 days.
- A list of 'action' items. All action items shall identify an individual responsible.
- Recommendations(s) for any human or financial resources needed for maintenance of improvement of the QMS.
- Minutes of management review meeting shall be maintained by the QMS Representative or designate. These minutes shall include the date and time of the review activity and the name of participants and attendees. Each participant and attendees shall review the completed minutes and sign them to ensure accuracy and clarity.

Raw Water Supply Statement

The Standard requires the Management Review to address raw water supply. Because the Township of Lucan Biddulph Water Distribution System receives water from the Lake Huron Water Supply System, raw water is not a component that requires consideration and therefore is not part of the Management Review procedure.