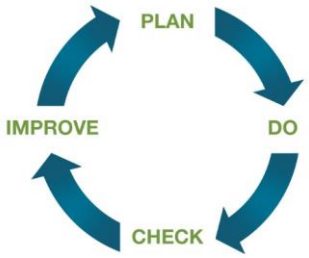


Oxford County
Growing stronger together

OXFORD COUNTY WATER SYSTEMS
DRINKING WATER QUALITY MANAGEMENT SYSTEM
OPERATIONAL PLAN

Beachville Drinking Water System
Bright Drinking Water System
Brownsville Drinking Water System
Dereham Centre Drinking Water System
Drumbo-Princeton Drinking Water System
Embro Drinking Water System
Hickson Drinking Water System
Ingersoll Drinking Water System
Innerkip Drinking Water System
Lakeside Drinking Water System
Mt. Elgin Drinking Water System
Oxford South Drinking Water System
Plattsville Drinking Water System
Tavistock Drinking Water System
Thamesford Drinking Water System
Tillsonburg Drinking Water ~~Supply~~ System
Woodstock Drinking Water ~~Supply~~ System

Table of Contents

INTRODUCTION

This Operational Plan documents the Quality Management System (QMS) developed for the Oxford County Water Systems listed on the title page of this plan to meet applicable legislation and regulatory requirements; specifically to meet the requirements of the Ontario Drinking Water Quality Management Standard (DWQMS), V2.0, Feb 2017 and to comply with the requirements of subsection 16(2) of the Safe Drinking Water Act (SDWA), 2002.

Together with this Plan, a copy of the QMS Master Document List, Schedule C – Director's Directions for Operational Plans (Subject System Description Form), Oxford County DWQMS Quality Manual, Oxford County Drinking Water Systems Emergency Response Plan, and Operations procedures referenced in the Risk Assessment Table shall be submitted to the Ministry and/or third party auditors upon request to demonstrate conformance with the DWQMS. This Operational Plan shall be reviewed annually. The continual improvement of this Plan will assist our efforts to comply with all regulatory requirements and to provide clean, reliable and safe drinking water to our customers.

The Top Management of Oxford County Public Works is committed to working with the Owner, Oxford County, to implement and maintain the Drinking Water Quality Management System. This commitment is documented in the Commitment and Endorsement statement shown on the following pages of this plan. Endorsement of the DWQMS shall be updated within six months after the election of a new County Council and/or if the Operating Authority for the system changes. New signatures are not required when the person in a signatory position changes.

COMMITMENT AND ENDORSEMENT STATEMENT

The implementation, maintenance and continual improvement of a Quality Management System (QMS) that is consistent with the Oxford County Drinking Water Quality Management Policy and meets the requirements of the Ministry's Drinking Water Quality Management Standard (DWQMS) is supported by:

- the system owner, Oxford County, represented by *Oxford County Council and Chief Administrative Officer (CAO)*, for all municipal residential drinking water systems in Oxford County and
- the operating authority, *Oxford County Public Works,* for all Municipal Residential Drinking Water ~~Distribution~~ Systems in Oxford County
  - ~~except the City of Woodstock and the Town of Tillsonburg, and~~
- ~~the operating authority, *Oxford County Public Works,* for all Municipal Residential Drinking Water Supply Systems in Oxford County.~~

Endorsement by County Council, and Top Management of the Operating ~~Authorities~~ Authority both acknowledges the need for, and supports the provision of, sufficient resources to maintain and continually improve the QMS.

The Oxford County QMS Coordinator is the designated QMS Representative responsible for the development and ongoing maintenance of the QMS for all municipal residential drinking water systems in Oxford County. The Coordinator is also responsible for reporting the effectiveness of the QMS, including the need for improvement, to Top Management and County Council. The QMS Coordinator will promote the QMS throughout ~~each of~~ the Operating ~~Authorities~~ Authority and to all relevant stakeholders.

The QMS Coordinator and Water & Wastewater Program Coordinators will ensure that personnel are aware of all current regulatory and legislative requirements relevant to the operation of the Oxford County drinking water systems.

This Operational Plan has been reviewed and approved by the system owner, QMS Coordinator and by the Top Management of the Operating Authority.

Benjamin R. Addley **Chief Administrative Officer**	**Date**	*David Simpson,, P.Eng., PMP* **Director of Public Works**	**Date**
Don Ford, C.Tech. **Manager of Water & Wastewater Services, Oxford County**	**Date**	*Angela Vander Gugten* **QMS Coordinator**	**Date**

Actual signatures must be obtained before an updated electronic signatory page is issued. The signed copy of this statement is kept on file by the QMS Coordinator.

TERMS AND DEFINITIONS

Applicable Legislative and Regulatory Requirements – the *Safe Drinking Water Act, 2002*, the *Ontario Water Resources Act, 1990* and all regulations and instruments issued under these Acts which are associated with drinking water.

Audit – a systematic and documented verification process that involves objectively obtaining and evaluating documents and processes to determine whether a quality management system conforms to the requirements of this Standard.

Booster Station – a facility within a water distribution system that increases pressure in the system

Consumer – the drinking water end user.

Corrective Action – action to eliminate the cause of a detected nonconformity of the QMS with the requirements of the DWQMS or other undesirable situation.

Critical Valve – valves that need to operate reliably in order to avoid the potential for hazardous events or substantial consequences, including:

a) transmission main valves including side isolation valves that would disrupt the flow of the transmission mains;
b) single feed mains (dead ends) without looping or with 20 or more service connections
c) large customers such as large manufacturers, hospitals, long-term care homes, and schools
d) isolation valves at water treatment facilities, pumphouses, booster stations and water storage facilities
e) difficult crossings such as rail corridors, large road corridors, culverts, bridges, under rivers, creeks, streams

Document – includes a sound recording, video tape, film, photograph, chart, graph, map, plan, survey, book of account, and information recorded or stored by means of any device.

Drinking Water Quality Management Standard (DWQMS) – the Ontario Ministry of the Environment Drinking Water Quality Management Standard and its collective requirements for a quality management system

Drinking-Water System – means a system of works, excluding plumbing, that is established for the purposes of providing users of the system with drinking water and that includes:

a. any thing used for the collection, production, treatment, storage, supply or distribution of water,
b. any thing that relates to the management of residue from the treatment process or the management of the discharge of a substance into the natural environment from the treatment system, and

c. a well or intake that serves as the source or entry point of raw water supply for the system

Elevated Water Storage – a facility within a water system that provides storage capacity and helps maintain pressure in the system; includes water towers, standpipes and elevated reservoirs.

Information instrumentation – includes non-regulatory instruments used for information purposes only. i.e. these instruments do not directly impact the operation of the facilities or the ability to meet legislated requirements.

Instrument Verification – confirmation that the instrument is measuring/recording accurate values; this may be done using a standard or comparison as appropriate for the instrument.

Ministry – unless otherwise specified refers to the Ontario Ministry responsible for the administration and enforcement the Safe Drinking Water Act, 2002, the Ontario Water Resources Act, 1990 and all regulations and instruments issued under these Acts which are associated with drinking water.

MOE – (Ontario) Ministry of the Environment; refers to the Ministry as defined above

Monitoring Station – a facility within a water distribution system that monitors specific parameters, usually residual chlorine, in the system.

Municipal Drinking-Water System – means a drinking-water system or part of a drinking-water system,

a. that is owned by a municipality or by a municipal service board established under section 195 of the *Municipal Act, 2001*,
b. that is owned by a corporation established under section 203 of the *Municipal Act, 2001*,
c. from which a municipality obtains or will obtain water under the terms of a contract between the municipality and the owner of the system, or
d. that is in a prescribed class.

Municipal Residential Drinking-Water System – a large municipal residential system or a small municipal residential system as defined in O. Reg. 170/03.

Operating Authority – means, in respect of a Subject System, the person or entity that is given responsibility by the owner for the operation, management, maintenance or alteration of the Subject System.

Operations Manual – means, in respect of a Subject System, the operations and maintenance manual for the system.

Operational Plan – means, in respect of a Subject System, the operational plan required by the Director's Direction.

Operational Subsystem – means a part of a Municipal Residential Drinking-Water System operated by a single operating authority and designated by the owner as being an Operational Subsystem.

Owner – includes, in respect of a drinking-water system, every person who is a legal or beneficial owner of all or part of the system, but does not include the Ontario Clean Water Agency or any of its predecessors where the Agency or predecessor is registered on title as the owner of the system.

Process Control Instrumentation – includes instruments used to collect data that is used for process control purposes. These instruments are usually important in the automatic operation of a facility. i.e. failure of these instruments could impact the operation of a facility, but not the water quality and/or regulatory compliance

Public – subject system consumers and stakeholders.

Pumphouse – a well pumping facility that provides raw or treated water to a water treatment facility

Quality Management System (QMS) – a system to:

a) establish policy and objectives, and to achieve those objectives, and
b) direct and control an organization with regard to quality.

Record – a document stating results achieved or providing proof of activities performed.

Regulatory instrumentation – includes all instruments used to collect data that is regulatory or legislated. i.e. failure of these instruments could impact the operation of a facility, water quality and/or may impact regulatory compliance

Service Provider – licensed individuals that are under contract to Oxford County to provide specific water distribution operations and maintenance services as prescribed by Oxford County's Operational Plan and Quality Management System and detailed in the respective service contract agreements.

Subject System – means:

a) a Municipal Residential Drinking Water System where the system is operated by one operating authority, or
b) an Operational Subsystem where two or more parts of a Municipal Residential Drinking-Water System are operated by different Operating Authorities.

Supplier – an organization or person that provides a product or service.

Top Management – a person, persons or a group of people at the highest management level within an operating authority that makes decisions respecting the QMS and recommendations to the owner respecting the subject system or subject systems.

Traceable calibration – means all measurements are traceable to national or international standards, wherever possible and as appropriate

Water Treatment Facility – a facility within a drinking water system that provides a treated point of entry to the water distribution system

Zone Valve – gate valve or check valve within a drinking water distribution system that limit pressure boundaries in boosted pressure zones

QUALITY MANAGEMENT SYSTEM

The quality procedures referenced in this Operational Plan are maintained in the Oxford County DWQMS Quality Manual. Relevant operational procedures shall be specifically referenced in the QMS documentation and maintained in the Water Operator Manuals.

QUALITY MANAGEMENT SYSTEM POLICY

The Oxford County Water Systems are owned by Oxford County and operated by the Oxford County Public Works Department. Both the Owner and Operating Authority are committed to the objectives outlined below in the Oxford County Drinking Water Quality Management Policy:

Oxford County is committed to:

- Providing its customers with safe, potable drinking water in the interest of protecting public health.
- Providing drinking water that consistently meets or exceeds regulatory requirements.
- Participating in appropriate research of Best Management Practices to enhance our understanding of drinking water quality issues and optimize performance.
- Promoting sound relationships with our customers, stakeholders, regulators, employees, suppliers, and service providers and integrating their needs and expectations into our planning.
- As a minimum, meeting the requirements of all applicable legislation and regulations.

Oxford County, Public Works will implement and maintain a Drinking Water Quality Management System as outlined by the Ministry. All employees involved in the supply, treatment and distribution of drinking water are responsible for understanding, implementing, maintaining and continually improving the Drinking Water Quality Management System. All service providers involved in the distribution of drinking water are responsible for following the provisions outlined in their service contract including awareness and application of the County's Drinking Water Quality Management System.

QMS REPRESENTATIVE

The Oxford County QMS Coordinator is the designated QMS Representative responsible for the development and ongoing maintenance of the QMS for all County-owned drinking water systems. The Coordinator is also responsible for reporting the effectiveness of the QMS, including the need for improvement, to Top Management and County Council. The QMS Coordinator will promote the QMS throughout ~~each of~~ the Operating ~~Authorities~~ Authority and to all relevant stakeholders. The Supervisor of Water & Wastewater Technical Services shall be the designated QMS Representative in the absence of the QMS Coordinator, but specific duties may be delegated to other Water Services staff as necessary.

DOCUMENT AND RECORDS CONTROLS

The procedure for document and records control, including identification, retention, storage and disposal is documented in the Oxford County DWQMS Quality Manual in procedure Q01-Documentation and Records Control.

DRINKING-WATER SYSTEM DESCRIPTIONS

The 17 Municipal Drinking water Systems are; owned by Oxford County, represented by the Oxford County Council and Chief Administrative Officer (CAO), and operated by the Oxford County Public Works and their service providers as per Service Contract Agreements.

A description of each of the Oxford County drinking water systems is included in Appendix III of this plan. Process flow charts (diagrams) for these systems are included in Appendix IV of this plan.

The Drinking Water System Descriptions and Process Flow Diagrams shall be reviewed annually as part of the Risk Assessment process and following the implementation of system changes.

Source Water

The drinking water supply for all Oxford County municipal drinking water systems use groundwater sources. The water sources have been assessed through monitoring the microbiological; chemical including organic, and inorganic; nitrate and nitrite; and turbidity. Details for Individual well construction are available in Appendix III and the Systems Operations and Maintenance Manuals. All results can be found the System's annual report and the Raw Water Assessment for Renewal of the Municipal Drinking Water License.

Water Treatment

Treatment for each of the County's municipal drinking water systems is provided to meet or exceed all drinking water quality requirements outlined in O. Reg 170/03 under the Safe Drinking Water Act. In some Systems treatment is provided for aesthetic parameters. Treatment methods utilized for each System are identified in Appendix III.

Water Distribution

Oxford County water distribution systems consist of water mains, booster pumping stations, elevated tanks, reservoirs, and other types of infrastructure. Chlorine residuals are maintained in the system with Secondary Disinfection.

Select portions of the distribution systems for the City of Woodstock and Town of Tillsonburg are Operated and Maintained by service providers as per Service Agreements defined by Oxford County.

RISK ASSESSMENT AND RISK ASSESSMENT OUTCOMES

The procedure which documents the risk assessment process for all Oxford County owned municipal residential drinking water systems is documented in the Oxford County DWQMS Quality Manual in procedure Q02-Risk Assessment Process.

The currency of the information and the validity of the assumptions used in the Risk Assessment shall be reviewed once every calendar year *or* following substantial completion of system upgrades, by the appropriate staff outlined in Q02-Risk Assessment Process. A full risk assessment shall be conducted at least once every 36 months. The Risk Assessment Team is responsible for identifying all actual and potential hazards, assessing the associated risks, determining critical control points and setting critical limits.

Commented [MS1]: Service providers requirements for participation in risk assessment process will be detailed in their Service Contract Agreements.

Records of the risk assessment and its outcomes, including Risk Assessment Tables and Risk Assessment Review Summary Reports are to be kept in accordance with the County's record retention schedule. The report will include a summary of system changes/upgrades since the last review and a list of items and/or projects from the risk assessment outcomes be considered as part of infrastructure review. These results will be communicated to Top Management as part of the annual management review and shall be considered and used to prioritize projects for budgetary consideration during infrastructure review.

ORGANIZATIONAL STRUCTURE, ROLES, RESPONSIBILITIES AND AUTHORITIES

The organizational structure of the Operating Authority is documented in the Oxford County Water Services Organizational Chart which is maintained in Appendix I of this Operational Plan.

Roles, responsibilities and authorities of Operating Authority staff are documented in the Responsibilities Table which is in Q09-Responsibilities and Competencies.

Top Management is responsible for undertaking a Management Review of the DWQMS, making decisions on the DWQMS and providing recommendations about the drinking water systems to the Owner, Oxford County Council. Top Management have been identified as:

- Director of Public Works; and
- Manager of Water & Wastewater Services.

The operating authority shall ensure that all employees identified in the Responsibilities Table detailed in Q09 shall attend a DWQMS Awareness Session and DWQMS "refresher training" sessions when provided.

COMPETENCIES

Required competencies for Operating Authority staff affecting drinking water quality are identified are documented in the Competencies Table which is in Q09-Responsibilities and Competencies. The operating authority shall ensure that all other individuals performing work on the municipal drinking water systems are appropriately qualified.

Competencies are satisfied for Operating Authority staff members by the following:

- Candidates considered for employment must submit proof of relevant education and/or qualifications as well as demonstrate technical competency and communication skills to an interview panel
- New employees shall undergo on-the-job training, conducted and documented by experienced staff. Training documentation is signed by the employee and trainer, acknowledging successful information transfer.
- Annual training is provided to ensure that operators meet minimum standards for annual training hours and continuing education hours as established in O. Reg. 128/04 to maintain Operator certification. This training is provided by experienced staff, technical experts, or contracted professional trainers.

- All employees identified in the Competencies Table shall undergo an orientation in which they review the Operational Plan~~(s)~~, Emergency Plan~~s~~, the Quality Manual and are made aware of how their duties relate to providing safe drinking water. An overview of the Subject System's Operations Manuals will also be provided. This shall normally be scheduled within 2 months of date of employment. Training records are maintained, acknowledging successful information transfer.

Training provision and certification levels meet or exceed those required by legislation. Oxford County and their service providers shall maintain training files for their staff and shall ensure that a copy of the certificate of each of their certified Operators is conspicuously displayed at the Public Works offices in the Oxford County Administration Building or the office of the service providers as per O. Reg. 128/04, s. 15.

Commented [MS2]: Service providers requirements for training, competencies, roles and responsibilities will be detailed in their Service Contract Agreements.

PERSONNEL COVERAGE

The Oxford County water treatment facilities (WTF's) are regularly monitored by Operators during two standard shifts:

- Monday to Friday 7:00am - 3:30pm
- Monday to Thursday 3:00pm - 11:30pm, Friday 12:00pm-8:30pm

Oxford County Distribution Operators are regularly scheduled Monday to Friday 7:00am - 3:30pm

Distribution Operations for the City of Woodstock and Town of Tillsonburg is supplemented by service providers that are regularly scheduled as per Service Contract Agreements defined by Oxford County.

One or more overall responsible operator's (ORO's) are regularly scheduled Monday to Friday for treatment or distribution or both.

When an operator calls in sick during regular hours, the duties are reassigned to other operators.

Outside of regular hours staff availability is ensured through the maintenance of an On-Call Schedule. The Water Services Supervisors are responsible for establishing and updating the On-Call Schedule. The On-Call Schedule provides a list of operators and supervisors scheduled for after-hours work including weekends and public holidays. Two on-call water treatment operators, one distribution operator and one back-up operator are scheduled to respond to alarms and conduct site checks if necessary. An on-call overall responsible operator (ORO) is also scheduled to oversee and authorize duties as required. If an on-call operator calls in sick, the back-up

operator will respond to alarms or reassign the on-call to another operator. On Call requirements of service providers will be outlined within their Service Contract Agreements.

All on-call Oxford County operators are capable of completing minimal weekend monitoring tasks at the WTF's. Most alarm conditions can be addressed by a single operator when following operational procedures and work instructions. If additional assistance is required, the on-call operator will seek assistance from the other on-call operators or the ORO.

The required response time for all after-hours alarms is within 60 minutes. This response time is considered reasonable based on the size of the County, distances between sites, conservative alarm set points and the multiple monitoring and treatment barriers in place that prevent risk to public health.

In the event of an emergency the on-call Manager will be notified. Detailed instructions regarding after-hours staffing, rationale and response times for contacting personnel and responding to emergency calls are maintained in:

- PW001 After-hours Emergency Calls Protocol for Public Works
- Oxford County Drinking Water Systems Emergency Response Plan

COMMUNICATIONS

The communication procedure for all Oxford County owned municipal residential drinking water systems is documented in the Oxford County DWQMS Quality Manual in procedure Q04 Communication. This procedure describes how the relevant aspects of the Quality Management System are communicated between Top Management and the owner, Operating Authority personnel, suppliers, contractors, service providers, and the public. The procedure also details how sampling, testing and monitoring results are recorded and shared between the Operating Authority and the Owner.

Commented [MS3]: Service providers communication procedures will be detailed in their Service Contract Agreements.

ESSENTIAL SUPPLIES AND SERVICES

Supplies and services essential for the delivery of safe drinking water for all Oxford County owned municipal residential drinking water systems are identified in the Supplies and Services Table which is included in the Oxford County DWQMS Quality Manual in procedure Q05-Essential Supplies and Services. This procedure includes the methods to ensure procurement and ensure quality of essential supplies and services.

Commented [MS4]: Town of Tillsonburg and City of Woodstock service providers will be included in the essential services list.

REVIEW AND PROVISION OF INFRASTRUCTURE

The procedure for review of the adequacy of the infrastructure necessary to operate and maintain all Oxford County owned municipal residential drinking water systems is documented in the Oxford County DWQMS Quality Manual in procedure Q06-Infrastructure Review. An infrastructure review shall be conducted at least once every calendar year.

Commented [MS5]: The process for considerations from service providers is detailed in their Engineering Service Contract Agreements.

INFRASTRUCTURE MAINTENANCE, REHABILITATION AND RENEWAL

Maintenance shall normally be completed using the method and frequency specified in manufacturer's manuals and appropriate industry standards. New construction, upgrades or planned maintenance work shall be completed in conjunction with other Public Works departments and utilities providers (e.g. hydro, gas) whenever practical or necessary. Contractors may be used for maintenance activities.

All infrastructure maintenance, rehabilitation and renewal projects shall adhere to the guidelines set out in the County of Oxford Design Guidelines and Supplemental Specifications.

All expenditures for infrastructure maintenance, rehabilitation and renewal shall adhere to the guidelines set out in the Operating Authority's Purchasing Policy. This policy details the procurement process for goods and services.

The program for infrastructure maintenance, rehabilitation and renewal shall be reviewed by the Water Operations Supervisor(s) who will monitor the effectiveness of these programs. A summary report shall be provided at the annual Management Review Meeting, after which the Owner will be informed through the results of the Management Review.

The program for infrastructure maintenance, rehabilitation and renewal is as follows:

PLANNED MAINTENANCE

Planned maintenance activities are scheduled or proactive activities required for maintaining or improving infrastructure. These activities may include, but are not limited to, equipment maintenance, leak detection, main replacements, hydrant testing, valve exercising, flushing mains, back-up system tests and filter maintenance or replacements.

Planned maintenance activities are defined by the Infrastructure Review process, manufacturers' literature and as listed in the Subject System Operations Manuals and the Distribution Systems

Operations Manual. Required levels of service for planned maintenance activities are set by Oxford County public works for all 17 municipal drinking water systems.

Planned maintenance shall be scheduled by the Water Operations Supervisor(s) or service provider designates (as per their Service Contract agreement). Planned maintenance tasks are communicated to Operators by the Lead Operator, Water Operations Supervisor, or service provider designate. All records are maintained at the Public Works Office or office of the service provider using the appropriate forms. Completed forms are reviewed and signed by the Supervisor or service provider designate. Planned maintenance activities may also be documented within facility logbooks or digitally using Cartegraph.

UNPLANNED MAINTENANCE

Unplanned maintenance is authorized based on the guidelines set out in the Operating Authority's Purchasing Policy and the organizational structure. All records are maintained at the Public Works Office using the appropriate forms. Completed forms are reviewed and signed by the Supervisor. Unplanned maintenance activities may also be documented within facility logbooks, digitally using tablets with Cartegraph.

Measures to prepare for and expedite unplanned maintenance include equipment redundancy (back up units), spare parts inventory, and availability of updated project plans.

INFRASTRUCTURE RENEWAL

System improvements, upgrades and replacement of aging infrastructure are planned by the Water Operations Supervisor(s), Manager of Water & Wastewater Services and the Director of Public Works. Service providers shall submit a proposed Capital Plan to the County for review and consideration as outlined in their Service Contract Agreement. All major expenses are identified in the budget and require approval from Oxford County Council. The Operating Authority shall maintain a long term forecast (minimum 5 years) of major infrastructure maintenance, rehabilitation and renewal activities.

SAMPLING, TESTING AND MONITORING

Sampling, testing and monitoring of the water supplied by all Oxford County owned municipal residential drinking water systems is conducted by the Oxford County Operating Authority as required by O. Reg. 170/03., Permits to Take Water (PTTW) the Municipal Drinking Water License and Drinking Water Works Permit for the Subject Systems. These requirements are summarized in Appendix IV Oxford County Water Systems Monitoring Requirements. Samples for laboratory

testing are collected by licensed Operators and submitted to an accredited laboratory for testing in accordance with O008 Sampling Procedure. The results of all microbiological and chemical samples (accredited laboratory results) shall be retained by a Water & Wastewater Coordinator.

A visual inspection ("rounds") of all water treatment facilities is conducted once daily. Other sites are checked weekly or as required. The facility control systems are programmed to monitor required process parameters and/or water characteristics in the systems. Well levels, pumps, flow meters, analyzers, chemical feed pumps, pressure and chemical supplies (by tank levels) are all monitored. Detailed information is documented in the Subject System Operations Manuals.

Operators may adjust processes affecting water quality based upon the information and data provided by the control systems. Any adjustments made to process parameters shall be recorded in the Facility Log book or operational data sheets. On-line turbidity and chlorine residual analyzers continuously monitor the treated water entering all distribution systems at the locations identified on the Process Flow Charts in Appendix II. The results are recorded and stored by a data recorder.

Oxford County personnel and service provider personnel ensure that the water in the distribution systems meets the Ontario Drinking Water Quality Standards and has a minimum free chlorine residual of at least 0.05mg/L. The Operating Authority and their service providers shall ensure that all parts of the distribution system in contact with drinking water which are taken out of service for inspection, repair or other activities that may lead to contamination before they are put back in service, are disinfected and sampled in accordance with O006 Responding to Distribution Main Breaks and O008 Sampling Procedure in the Drinking Water Distribution Systems Procedures Manual.

Portable chlorine residual and turbidity meters are maintained by the County for operational use when putting new mains into service, repairing main breaks, flushing dead ends and responding to customer complaints. Results are recorded in the operator's log books and on the appropriate operations forms. Backflow test kits are also maintained by the County for testing of backflow prevention devices at water treatment facilities, pumphouses and water main construction sites.

Regulated reportable adverse water quality incidents (AWQI's) shall be reported following O005 Water Quality Corrective Actions and Reporting Requirements for Municipal Residential Systems which is included in the Subject System Operations Manuals. A summary of the sampling and testing results for all Oxford County owned municipal residential drinking water systems is provided in the Annual Reports prepared in accordance with O.Reg.170/03. These reports are

prepared by a Water & Wastewater Coordinator and then summarized and presented to the Owner annually during a County Council Meeting.

CALIBRATION AND MAINTENANCE OF MEASUREMENT AND RECORDING EQUIPMENT

Measurement and recording equipment such as flow meters, on-line chlorine analyzers and turbidity meters and backflow test kits shall be calibrated using the method specified in the manufacturer's manual. Pressure transducers can be compared to manual gauges at any time and will normally only be calibrated if they fail. The annual, scheduled overflowing of towers and reservoirs also serves to verify their operation. Regulatory instrumentation shall be calibrated, where possible, as specified in applicable legislation or at least once every year. Where true calibration is impossible or impractical, the instrument shall be calibrated by comparison to another instrument which has a traceable calibration record, as a standard. Information instruments and process control instruments shall be calibrated when a verification check fails or the instrument fails or more frequently.

Only qualified individuals shall perform traceable calibrations on regulatory instrumentation. For the purposes of our Operating Authority and it's service providers, individuals performing calibration services are considered qualified if they are trained by the original equipment manufacturer (OEM) or they are trained instrumentation technicians familiar with the equipment or they are an ISO17025 accredited (calibration lab) service provider. All other calibrations or instrument verifications shall be performed by a qualified subcontractor or a trained person.

An Instrument Calibration/Verification Schedule and records of calibrations/verifications shall be maintained by the Water Operations Supervisor or the Instrumentation and Controls Technician. Records of calibrations shall identify who performed the calibration and the name of the company, where applicable; instruments and standards used for the calibrations and shall include the date and results. Records of measurement uncertainty and any other relevant conditions at the time of calibration are preferred, but not required. Records of the calibrations are to be kept in accordance with the County's record retention schedule.

Contractors used for performing calibrations are listed in the Supplies and Services Table which is included in the Oxford County DWQMS Quality Manual in procedure Q05-Essential Supplies and Services.

EMERGENCY MANAGEMENT

Emergency situations or service interruptions that could occur include, but are not limited to, loss of power, contamination, transmission line or major water main breaks or interruptions in service pressure. The Risk Assessment Tables in Appendix VII references specific emergency procedures or plans.

The Oxford County Drinking Water Systems Emergency Response Plan details the emergency procedures that are in place. An Emergency Contacts list can be found in the plan. This emergency plan is reviewed annually and updated as required. The Emergency Contact list shall be kept current by the QMS Coordinator or designate.

The responsibilities of all positions in the Operating Authority during a drinking water related emergency are listed in the Oxford County Drinking Water Systems Emergency Response Plan and the Oxford County Emergency Response Plan.

Calls regarding water problems after-hours shall be directed to on-call personnel and urgent issues shall be investigated promptly.

Operating authority staff shall review the emergency plans annually. In addition, testing on the Emergency Response Plan (ERP) shall be conducted periodically to keep personnel up to date on the emergency procedures and to identify any gaps in the ERP procedures. The training and testing records are to be kept in accordance with the County's record retention schedule.

INTERNAL AUDITS

The internal audit process is documented in the Oxford County DWQMS Quality Manual in procedure Q07-Internal DWQMS Audits. The QMS Coordinator shall initiate and participate in the internal audit process. An internal audit shall be conducted at least once every calendar year.

MANAGEMENT REVIEW

The management review process is documented in the Oxford County DWQMS Quality Manual in procedure Q08-Management Reviews. The Oxford County Manager of Water & Wastewater Services shall initiate and participate in the management review process. A management review shall be conducted at least once every calendar year. The results of the management review shall be reported to County Council (the Owner) by the Manager of Water & Wastewater Services during a subsequent County Council meeting. Updates to the Operational Plan shall be communicated to the Owner at this time to ensure their continued commitment to and endorsement of this Plan.

CONTINUAL IMPROVEMENT

Oxford County Public Works will implement and maintain a Drinking Water Quality Management System as outlined by the Ministry. All employees involved in the supply, treatment and distribution of drinking water are responsible for understanding, implementing, maintaining and continuously improving the Drinking Water Quality Management System.

All service providers involved in the distribution of drinking water are responsible for following the provisions outlined in their service contract including awareness and application of the County's Drinking Water Quality Management System.

The continual improvement process for all Oxford County owned municipal residential drinking water systems is documented in the Oxford County DWQMS Quality Manual in procedure Q03-Continual Improvement Process.

REVISION HISTORY

May 2009 First version approved and issued

Feb 2011 Reviewed and revised, updated risk assessment table included

Dec 2011 Revision History section added, minor updates, including updates prompted by ICAR's from the Internal Audit Process and annual review of Process Flow Diagram and System Description; Revised Organizational Chart for Appendix III included; System names updated on title page to include the word "drinking"; included updated risk assessment tables

Jun 2012 Updated Commitment & Endorsement pages; newly elected County Council endorsed the DWQMS Operational Plans on 8 Feb 2012

Aug 2012 Updated raw water E.coli & Total Coliform data, population & # services data and standby power info in Appendix V; updated and clarified the Maintenance and Calibration of Measurement Instrumentation section; added definitions related to instrumentation and calibration; updated system descriptions, including the deletion of the Princeton Cistern System and the connection of the Drumbo system to the new Princeton Distribution to form the Drumbo-Princeton DWS

Sep 2012 Updated addresses for Tillsonburg Rokeby Rd. WTF and Drumbo Main WTF; included definition for Process Control Instrumentation; clarified who requires DWQMS Awareness Training and that only those roles that directly affect drinking water quality are included in the Competency Table

Jul 2013 Minor changes to Introduction section; included record-retention of regulatory communication; added name of new CAO; minor changes to the most of the Tables and Organizational Chart; updated Flow Charts of Otterville-Springford, Thamesford, and Tillsonburg systems; added record-retention of risk assessment, calibration, and emergency management training and testing

Jul 2014 Threats identified in the Assessment Reports were included in system descriptions, minor updates to Introduction section re: documents submitted to show conformance and signatories to the C&E statement; deleted reference to submission of management review minutes to County Council; removed record-retention of regulatory communication as it was unnecessarily added to the C&E statement; updated to reflect Oxford South DWS; updated to reflect annual review of risk assessments, water system descriptions and process flow charts; included definition for "once every 12 months"

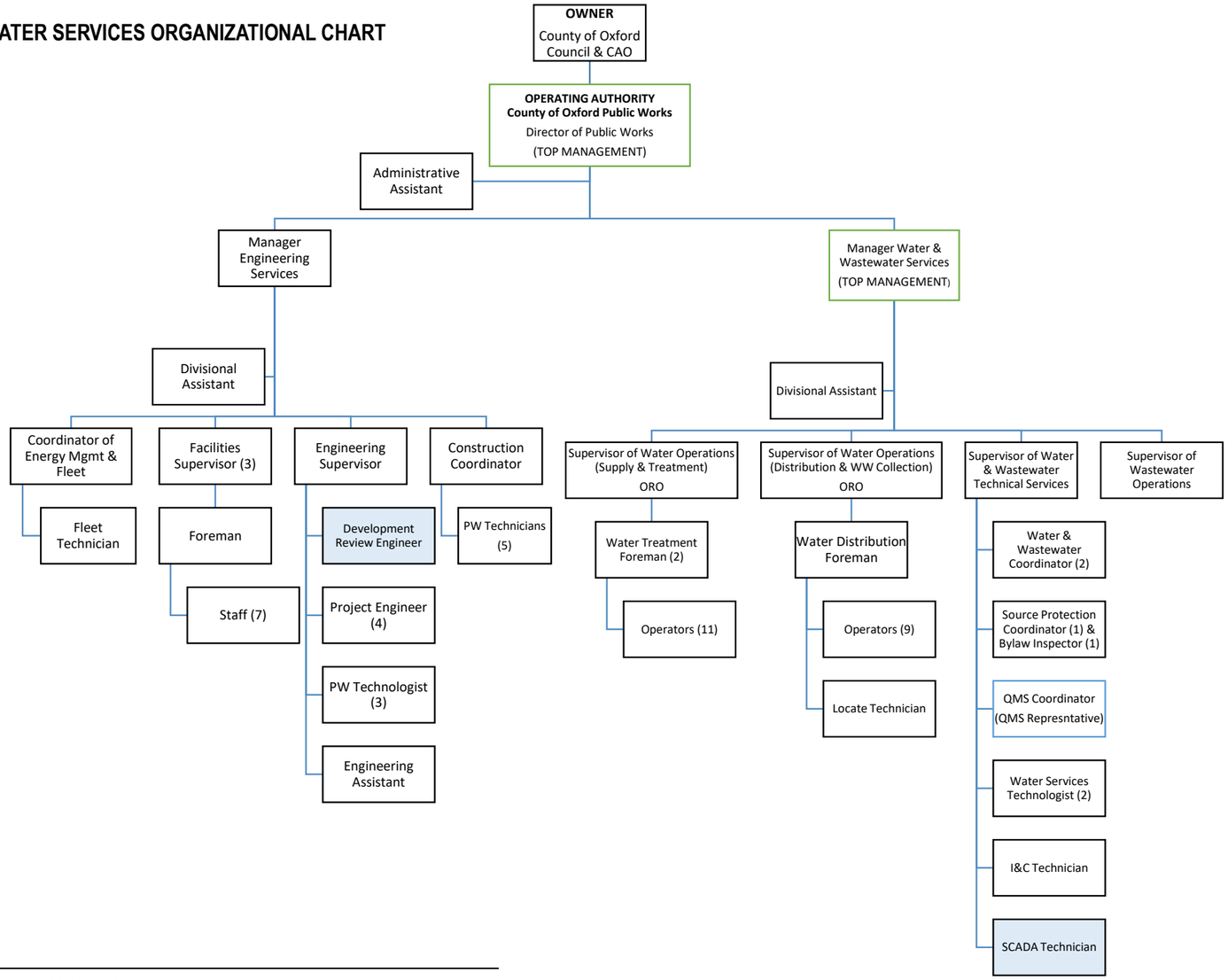
Mar 2015 Updated personnel added to C&E signatories; update to DWQMS Policy; updated raw water quality data in system descriptions; updated Process Flow Diagrams for Brownsville, Embro, Ingersoll, Innerkip, Plattsville, Tillsonburg Supply & Woodstock Supply; updated risk assessment tables for all systems

Dec 2015 Updated Lakeside System Description with correct standpipe volume; updated Responsibilities Table; updated Beachville System Description; updated Appendix I and II to include Instrumentation Tech; updated Bright System Description with correct standpipe volume; removed outdated backwashing process from Embro System Description; updated to reflect annual review of risk assessments; updated system descriptions and process flow charts, revised Competency Requirements Table for Instrumentation and Control Technician.

April 2017 Updated process flow diagrams for Beachville, Bright & Drumbo-Princeton, Ingersoll, Tillsonburg Supply, Woodstock Supply, Distribution I&II; Updated Appendix I and III to include

	the Source Water Protection staff and Oxford County PW Reorg (Jan 2017); updated Appendix IV; updated reference to new DWQMS Standard and multiple updates related to changes in the standard; deleted "once every 12 months" definition as new standard references "once every calendar year"; updated to reflect annual review of risk assessments, water system descriptions and process flow charts
July 2018	Updated Appendices III, IV, V, VI, VII. Updated to reflect annual review of risk assessments, water system descriptions and process flow charts; added definitions for "Ministry" and "MOE" for clarity and to prevent the necessity to update documents each time the name of the Ministry is changed. Included new Oxford County Logo.
Feb 2019	Updated Appendix III, IV; updated address of Embro WTF; clarified infrastructure review frequency from "once every 12 months" to "once every calendar year" to reflect update to DWQMS Standard; clarified Infrastructure Maintenance, Rehabilitation and Renewal Section to identify planned/proactive and unplanned maintenance activities are documented within facility logbooks, digitally using tablet/Cartegraph integration; updated signatory names on C&E statement; updated risk assessment tables
Sep 2020	Updated Appendix I, II, III, V, VI; updated C&E statement including signatory names; included definition for "critical valves", "zone valves"
May 2021	Included updated risk assessment table (Nov2021); minor updates to Appendix IV & V; updated Appendix III to include new SCADA Technician and Development Review Engineer and other minor updates to position titles as well as the minor reorganization of the Tillsonburg OA with the elimination of the Manager of Water/Wastewater and the Water Operation Supervisor now reporting to the Tillsonburg Manager of Public Works; updated the manner in which process flow diagrams are appended to the Operational Plan such that updates to process flow diagrams do not require a revision of the Operational Plan. Updated diagrams are included in the Plan Appendix when they are issued. Process flow charts have their own revision control noted in the title block of each drawing.
Oct 2022	Include reference to Schedule C of Director's Directions; updated Appendix I and Appendix II to include new SCADA Technologist position and other general updates; minor updates to system descriptions; updated population estimates based on 2021 Census; updated to document that the Instrumentation and Controls Technician is now responsible for scheduling and maintaining records for calibrations previously done by the Water and Wastewater Program Coordinator; minor updates to Appendix IV
May 2023	Modernize the Operational Plan and reduce information redundancies including; formatting, streamlining system descriptions Appendix, updates to supplier definition, position title updates, updated to planned maintenance section including addition of Cartegraph usage, Appendix and Quality Procedure realignments, and moving the revision history to the end of the document.
May 2023	Revisions made throughout the Operational Plan to represent the consolidation of Operational Plans into a single document for all 17 municipal drinking water systems.

APPENDIX I- OXFORD COUNTY WATER SERVICES ORGANIZATIONAL CHART



APPENDIX II– OXFORD COUNTY WATER SYSTEMS MONITORING REQUIREMENTS

OXFORD COUNTY DRINKING WATER SYSTEMS - WATER QUALITY MONITORING REQUIREMENTS of O.REG 170/03, MDWL and PTTW.

System	Required by O.Reg 170/03 applicable schedules												Req'd by MDWL	Req'd by PTTW Level Measurements (for wells in production)
	Sched 7 ***Distribution*** **free Cl_2** grab	Sched 7 ***Raw water each well*** **turbidity** grab	Sch 10/11 ***Distribution*** **Bacti+Cl_2** grab	Sch 10/11 ***Treated water*** **Bacti+Cl_2** grab	Sch 10/11 ***Raw water each well*** **Bacti** grab	Sched 13 ***Treated water*** **Inorganics** Sched 23 grab	Sched 13 ***Distribution*** **Lead** grab	Sched 13 ***Treated water*** **Organics** Sched 24 grab	Sched 13 ***Distribution*** **THM's HAA's** grab	Sched 13 ***Treated water*** **Nitrate & Nitrite** grab	Sched 13 ***Treated water*** **Sodium** grab	Sched 13 ***Treated water*** **Fluoride** grab		
Beachville **Small** Mun Non GUDI	2/wk	1/month	bi-weekly TC, EC, HPC		1/month	60 months	pH/Alk 2x per year and Lead in every 3rd year in accordance with reduced sampling schedule per SDWA, Reg. 170/03	60 months	3 months	3 months	60 months	60 months	none	P.well static level monthly
Dereham **Small** Mun Not GUDI	2/wk	1/month	bi-weekly TC, EC, HPC		1/month	60 months 3 months for As		60 months	3 months	3 months	60 months	60 months	none	Not Applicable (No PTTW req'd)
Hickson **Small** Mun Not GUDI	2/wk	1/month	bi-weekly TC, EC, HPC		1/month	60 months		60 months	3 months	3 months	60 months	60 months	none	P.well static level monthly
Bright **Large** Mun Not GUDI	7/wk or continuous	1/month	8/month TC, EC & 25% HPC	1/week	1/week	36 months		36 months	3 months	3 months	60 months	60 months	none	P.well static level monthly OBS well level monthly
Brownsville **Large** Mun Not GUDI	7/wk or continuous	1/month	8/month TC, EC & 25% HPC	1/week	1/week	36 months 3 months for As		36 months	3 months	3 months	60 months	60 months	none	P.wells static level monthly
Drumbo - Princeton **Large** Mun Not GUDI	7/wk or continuous	1/month	10/month TC, EC & 25% HPC	1/week	1/week	36 months		36 months	3 months	3 months	60 months	60 months	none	P.wells static or dynamic level bi weekly
Embro **Large** Mun Not GUDI	7/wk or continuous	1/month	9/month TC, EC & 25% HPC	1/week	1/week	36 months		36 months	3 months	3 months	60 months	60 months	none	OBS well static level monthly
Ingersoll **Large** Mun Not GUDI	7/wk or continuous	1/month	22/month TC, EC & 25% HPC	1/week each POE	1/week	36 months each POE		36 months each POE	3 months each POE	3 months each POE	60 months each POE	60 months each POE	sulphides 1/year raw & Trtd treated	W2, W3, W5, W7, W8, W10, W11 static level monthly
Innerkip **Large** Mun Not GUDI	7/wk or continuous	1/month	10/month TC, EC & 25% HPC	1/week	1/week	36 months		36 months	3 months	3 months	60 months	60 months	Lagoon discharge weekly grab sample for TSS	P.wells and TW2 static or dynamic take on same day monthly
Lakeside **Large** Mun Not GUDI	7/wk or continuous	1/month	8/month TC, EC & 25% HPC	1/week	1/week	36 months	pH/Alk 2x per year and Lead in every 3rd year in accordance with reduced sampling schedule per SDWA, Reg. 170/03	36 months	3 months	3 months	60 months	60 months	none	P.well static or dynamic level monthly
Mt Elgin **Large** Mun Not GUDI	7/wk or continuous	1/month	8/month TC,EC & 25% HPC	1/week	1/week	36 months		36 months	3 months each POE	3 months each POE	60 months	60 months	none	P.wells static level monthly pumping level quarterly
Oxford South **Large** Mun Not GUDI Norwich; Pitcher 2&5 & Main 4 Otterville 3&4 Springford 4&5	7/wk or continuous	1/month	14/month TC, EC & 25% HPC	1/week each POE	1/week	36 months each POE 3 months for As in Springford		36 months each POE	3 months each POE	3 months each POE	60 months each POE	60 months each POE	none	Minimum weekly P.wells static or dynamic with automated recorder & download data *regularly* For manual levels, static or dynamic monthly
Plattsville **Large** Mun Not GUDI	7/wk or continuous	1/month	10/month TC,EC & 25% HPC	1/week	1/week	36 months		36 months	3 months	3 months	60 months	60 months	none	P.well static level monthly
Tavistock **Large** Mun Not GUDI	7/wk or continuous	1/month	11/month TC, EC & 25% HPC	1/week	1/week	36 months		36 months	3 months	3 months	60 months	60 months	none	P.wells static levels monthly can't run W 2a &3 concurrently

OXFORD COUNTY DRINKING WATER SYSTEMS - WATER QUALITY MONITORING REQUIREMENTS of O.REG 170/03, MDWL and PTTW.

System	Required by O.Reg 170/03 applicable schedules												Req'd by MDWL	Req'd by PTTW Level Measurements (for wells in production)
	Sched 7 ***Distribution*** **free Cl_2** grab	Sched 7 ***Raw water each well*** **turbidity** grab	Sch 10/11 ***Distribution*** **Bacti+Cl_2** grab	Sch 10/11 ***Treated water*** **Bacti+Cl_2** grab	Sch 10/11 ***Raw water each well*** **Bacti** grab	Sched 13 ***Treated water*** **Inorganics** Sched 23 grab	Sched 13 ***Distribution*** **Lead** grab	Sched 13 ***Treated water*** **Organics** Sched 24 grab	Sched 13 ***Distribution*** **THM's HAA's** grab	Sched 13 ***Treated water*** **Nitrate & Nitrite** grab	Sched 13 ***Treated water*** **Sodium** grab	Sched 13 ***Treated water*** **Fluoride** grab		
Thamesford **Large** Mun 3-Not GUDI 1, 2-**GUDI**	7/wk or continuous	1/month	11/month TC, EC & 25% HPC	1/week	1/week	12 months	pH/Alk 2x per year and Lead in every 3rd year in accordance with reduced sampling schedule per SDWA, Reg. 170/03	12 months	3 months	3 months	60 monthd	60 monthd	*Every 4 hrs* test/record UV flow, UVT, lamp status	P.Wells 1 or 2 and Pw 3 or TW6 hourly with an automated device. & download data *regularly*
Tillsonburg **Large** Mun Bell Mill Rd 9, 10-**GUDI** 11-not GUDI	7/wk or continuous	1/month	27/month TC, EC & 25% HPC	1/week each POE	1/week	12 months		12 months	3 months	3 months	60 months	60 months	*Every 4 hrs* test/record UV flow, UVT, lamp status	P.wells static or dynamic on a regular basis
Tillsonburg Mall Rd 1A,2 **GUDI**	incl.above	1/month	incl.above	1/week	1/week	12 months		12 months	incl.above	3 months	60 months	60 months		OBS wells approx. monthly over a 1- 2 day period. see approved monitoring program
Tillsonburg Fairview WTP 4,5,7A-**GUDI** 3-not GUDI	incl.above	1/month	incl.above	1/week	1/week	12 months		12 months	incl.above	3 months	60 months	60 months	*Every 4 hrs* test/record UV flow, UVT, lamp status	
Tillsonburg Rokeby Rd 12-not GUDI	incl.above	1/month	incl.above	1/week	1/week	36 months		36 months	incl.above	3 months	60 months	60 months		As above
Tillsonburg Plank Line 6A-not GUDI	incl.above	1/month	incl.above	1/week	1/week	36 months		36 months	incl.above	3 months	60 months	60 months		
Woodstock Thornton **Large** Mun 1,2,3,4,5, 8 - **GUDI**	7/wk or continuous	1/month	57/month TC, EC & 25 % HPC	1/week each POE	1/week	3 months for As 12 months		12 months	3 months	3 months	60 months	60 months	*Weekly* Nitrate in combined treated water *Every 4 hrs* UV flow, UV dose, lamp status	Static levels in all production wells and established obs. wells monthly. If operation makes it challenging to obtain true static level, take pumping level monthly for duration of permit and continue to obtain static levels when available
Woodstock Non GUDI wells Thornton W11 SouthsideW6,9 Sutherland W7 Trilliium W12	incl.above	1/month	incl.above	1/week	1/week	36 months		36 months	incl.above	3 months	60 months	60 months		

Free chlorine and turbidity of treated water (@ entry to distrib'n) is continuously monitored by on-line analyzers.
Each Small Non GUDI System treated water Point of Entry (POE) to distribution must be sampled every 5 years for chemical parameters.
Each Non GUDI Large System treated water Point of Entry (POE) to distribution must be sampled every 3 years for chemical parameters.
Sampling frequency of treated water inorganics & organics (sch 23 & 24) increase to once/3 months when any parameter is > 0.5 MAC
When Non-GUDI treated water are below 0.5 MAC during 2 consecutive three-month periods results; normal sampling resumes.
For GUDI treated water: during 4 consecutive three-month periods, results are below 0.5 MAC, then normal sampling resumes.
Bacteriological samples are requied bi-weekly from Small Systems and weekly from Large Systems.

Distribution Bacti samples for Small Systems must *all* be tested for FCI, E.Coli and total coliforms and general population as a HPC
Distribution Bacti samples for Large must *all* be tested for FCI, E.Coli and total coliforms plus 25% for general population as a HPC
Treated water Bacti samples for Large Systems must be tested for FCI, E.Coli, total coliforms and general population as a HPC
Raw water Bacti samples for Large and Small Systems must be tested for E.Coli and total coliforms
PTTWs require a record of all water takings, dates and times, rates of pumping, and amounts of water pumped for each day that water is taken under the authorization of the permit.

APPENDIX III – DRINKING WATER SYSTEM DESCRIPTIONS

Location	Loweville subdivision of the Community of Beachville, South West Oxford Township	
O.Reg. 170/03 Classification	Small Municipal Residential Water System	
Production well(s)	**Well 1**	
Date of Installation	1973	
Depth	91.4 metres below ground surface	
Maximum Flowrate	7.6L/s (456L/min)	
Overburden/Bedrock	Bedrock (both upper and lower)	
GUDI Status	Secure Groundwater	
Water Treatment location(s)	434706 West Hill Road, Beachville	
Treatment Method	Disinfection only	
Process Summary	Raw water is extracted with a submersible pump and flow metered. Sodium hypochlorite is injected upstream of a chlorine contact pipe, the water is discharged into a 40 m3 treated water reservoir which, along with the contact pipe, provides the necessary CT. The chlorination system consists of a day tank and two chemical feed pumps, one duty and one standby. The reservoir is equipped with 3 high lift pumps feeding the distribution system. Six hydro-pneumatic pressure tanks connected to the distribution header provide a useable storage of 340L, smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. There is also a reservoir bypass pipe with shutoff valve. Under reservoir maintenance operations, the well pump supplies water directly from the contact pipe to the distribution system. On-line equipment continuously monitors treated water flow, pressure, turbidity and residual free chlorine in the distribution header. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A standby diesel generator will start automatically in case of a power outage.	
Bright Drinking Water System		
Location	Community of Bright, Blandford-Blenheim Township	
O.Reg. 170/03 Classification	Large Municipal Residential Water System	
Production well(s)	**Well 4A**	**Well 5**
Date of Installation	2009	2003
Depth	30.5m	25.9m
Maximum Flowrate	3.78L/s	3.78L/s
Overburden/Bedrock	Overburden	Overburden
GUDI Status	Secure Groundwater	Secure Groundwater
Water Treatment location(s)	56 Wilson St	
Treatment Method	Disinfection and iron sequestration	

Process Summary	At the Cuthbertson Street Pumphouse, raw water is extracted with submersible pumps and flow metered. Sodium hypochlorite for disinfection and sodium silicate for iron sequestration are injected upstream of a chlorine contact pipe which provides the necessary CT. The chlorination system consists of two feed systems each with a day tank and two chemical feed pumps, one duty and one standby. The sodium silicate feed system consists of two chemical feed pumps - one duty and one standby and a day tank. . There is a pressure tank connected to the contact piping. Following treatment water is discharged through a transmission main to the Wilson St. WTF. During normal operations, the well pump supplies water directly from the contact pipe to the standpipe and reservoir at Wilson St. WTF. During reservoir maintenance operations (bypass), the well pump supplies water directly from the contact pipe to the standpipe. During standpipe maintenance operations (bypass), the well pump supplies water directly from the contact pipe to the reservoir. The Wilson St. WTF is equipped with high lift pumps feeding the distribution system. Four hydro-pneumatic pressure tanks connected to the distribution header provide a useable storage of 340L, smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. A 182 m^3 standpipe located outside of the Wilson St. WTF provides additional storage. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm. A chlorine analyzer located at the pumphouse monitors the chlorine residual in the distribution system. At Wilson St. a standby diesel generator will start automatically in case of a power outage. The Cuthbertson St. Pumphouse can be powered by a mobile generator as needed.	
Brownsville Drinking Water System		
Location	Community of Brownsville, South West Oxford Township	
O.Reg. 170/03 Classification	Large Municipal Residential Water System	
Production well(s)	**Well 5**	**Well 6**
Date of Installation	1990	1998
Depth	46.9 m	32.3 m
Maximum Flowrate	2.3 L/s	2.0 L/s
Overburden/Bedrock	Overburden	Overburden
GUDI Status	Secure Groundwater	Secure Groundwater
Water Treatment location(s)	292197 Culloden Line	
Treatment Method	Disinfection only	
Process Summary	At each well raw water is extracted with submersible pumps and is flow metered. Sodium hypochlorite for disinfection is injected prior to discharging to a transmission main which acts as a chlorine contact pipe and delivers the treated water to the WTF. The chlorination system at each pumphouse consists of a day tank and two chemical feed pumps, one duty and one standby. The building is equipped with a 197m^3 treated water storage reservoir and three high lift pumps feeding the distribution system. Six hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm. A chlorine analyzer located at the Well 6 Pumphouse monitors the	

	chlorine residual in the distribution system. Well 6 has high arsenic levels, but mixing with water from well 5 produces water below ½ MAC. A standby diesel generator, located outside the Culloden Line Reservoir building, will start automatically in case of a power outage. The pumphouses can be powered by a mobile generator as needed.		
Dereham Centre Drinking Water System			
Location	Community of Dereham Centre, South West Oxford Township		
O.Reg. 170/03 Classification	Small Municipal Residential Water System		
Production well(s)	**Well 2**		
Date of Installation	2000		
Depth	36 metres below ground surface		
Maximum Flowrate	54L/min, 77.76m^3/day If the well pump runs 24hrs/day at 55L/min, its output will be 79.2m3/day, which exceeds the MDWL limit and would require a PTTW. Currently no PTTW is required if average water taking is less than 35L/min (50m^3/day)		
Overburden/Bedrock	Overburden		
GUDI Status	Secure Groundwater		
Water Treatment location(s)	312894 Dereham Line		
Treatment Method	Disinfection and iron sequestration		
Process Summary	Raw water is extracted with a submersible pump and flow metered .Sodium hypochlorite is first added to oxidize the iron and manganese in the raw water. The water is conveyed to two pressure filters to remove iron and manganese particulates and reduce arsenic in the treated water. The 36.6m^3 treated water storage reservoir provides the necessary CT. The chlorination system consists of a day tank and two chemical feed pumps, one duty and one standby. Three high lift pumps convey treated water to the distribution system. Two hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. Backwashing of the filters to remove particle build-up occurs automatically based on run time or head loss through the filter. Backwash is stored in an on-site holding tank. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A standby diesel generator will start automatically. In case of a power outage,		
Drumbo - Princeton Drinking Water System			
Location	Communities of Drumbo and Princeton in Blandford Blenheim Township		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Well 1**	**Well 2A**	**Well 3**
Date of Installation	1978	2002	1994
Depth	50.9	43.3 m	29 m
Maximum Flowrate	3.15L/s	3.9L/s	8.3L/s
Overburden/Bedrock	Overburden	Overburden	Overburden

GUDI Status	Secure Groundwater	Secure Groundwater	Secure Groundwater
Water Treatment location(s)	93 Peterson St., Drumbo		
Treatment Method	Disinfection and iron sequestration		
Process Summary	Raw water is extracted with a submersible pump and flow metered. Sodium hypochlorite added to oxidize the iron and manganese in the raw water. The water is conveyed to two pressure filters to remove iron and manganese particulates and reduce arsenic in the treated water. The 36.6m^3 treated water storage reservoir provides the necessary CT. The chlorination system consists of a day tank and two chemical feed pumps, one duty and one standby. Three high lift pumps convey treated water to the distribution system. Two hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. Backwashing of the filters to remove particle build-up occurs automatically based on run time or head loss through the filter. Backwash is stored in an on-site holding tank. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A standby diesel generator will start automatically in case of a power outage.		
Embro Drinking Water System			
Location	Community of Embro, Zorra Township		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Well 1A**	**Well 3**	
Date of Installation	2009	1998	
Depth	57.9m	61 m	
Maximum Flowrate	10.6L/s	10.6L/s	
Overburden/Bedrock	Bedrock	Bedrock	
GUDI Status	Secure Groundwater	Secure Groundwater	
Water Treatment location(s)	117 Elgin Street, Embro		
Treatment Method	Filtration for iron removal and disinfection		
Process Summary	Raw water is extracted with submersible pumps, flow metered and directed to the facility's filtration process consisting of two trains operating in parallel and consists of aeration tanks to oxidize the iron and manganese present in the raw water, de-aeration tanks to remove excess air, and gravity filters to remove the oxidized iron. Disinfection of the filtered water is achieved by injecting sodium hypochlorite at the inlet of the aeration tank. The filter outlet chamber and the treated water storage reservoir provide CT. High lift pumps convey treated water from the reservoir to the distribution system. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. An additional distribution chlorine monitoring analyzer is located at the Main Lift Station. A permanent natural gas powered generator with automatic transfer switch will start automatically in case of a power outage.		
Hickson Drinking Water System			
Location	Community of Hickson, East Zorra-Tavistock Township		

O.Reg. 170/03 Classification	Small Municipal Residential Water System		
Production well(s)	**Well 2**		
Date of Installation	1992		
Depth	53.3 metres below ground surface		
Overburden/Bedrock	Bedrock		
GUDI Status	Secure Groundwater		
Water Treatment location(s)	531 John St		
Treatment Method	Disinfection only		
Process Summary	Raw water is extracted with a submersible pump and flow metered. Sodium hypochlorite for disinfection is injected upstream of a 62m^3 storage reservoir which provides the necessary CT. The chlorination system consists of a day tank and two chemical feed pumps, one duty and one standby. Three high lift pumps convey treated water from the storage reservoir to the distribution system. Four hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A standby diesel generator will start automatically in case of a power outage.		
Ingersoll Drinking Water System			
Location	Town of Ingersoll		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Well 2**	**Well 3**	**Well 5**
Date of Installation	1930	1945	1970
Depth	140.8m	117m	108.3m
Maximum Flowrate	34.2L/s	38.0L/s	37.9L/s
Overburden/Bedrock	Bedrock	Bedrock	Bedrock
GUDI Status	Secure Groundwater	Secure Groundwater	Secure Groundwater
Production well(s)	**Well 7** (offline)	**Well 8**	**Well 10**
Date of Installation	1977	1979	1987
Depth	123.3m	125.7m	112.4m
Maximum Flowrate	53.0L/s	37.9L/s	53.0L/s
Overburden/Bedrock	Bedrock	Bedrock	Bedrock
GUDI Status	123.3m	125.7m	112.4m
Water Treatment location(s)	Merritt St WTF	195 Merritt St	
	Hamilton Rd WTF	253387 Line 25	
	Canterbury St WTF	280 Harris St. Ingersoll	
	West St WTF (currently off line)	440 Thomas St	

	Dunn's Rd WTF	334581 Line 33 Zorra Twp.
	Thompson St WTF	5 Thompson Rd.
	Wallace Line WTF (currently off line)	274111 Wallace Line
Treatment Method	Disinfection and filtration for hydrogen sulphide removal.	
Process Summary	Ingersoll's six supply wells each have their own treatment facility. Each WTF has an underground reservoir, automated chlorine injection system, monitoring and alarm equipment, and supplies water directly to the distribution system. The wells and associated WTF are: Merritt Street WTF– Well 2 Hamilton Road WTF – Well 3 Canterbury Street WTF – Well 5 West Street WTF – Well 7 Dunn's Road WTF – Well 8 Thompson Road WTF – Well 10 Treatment at each WTF consists of: Oxidation with sodium hypochlorite ("pre-chlorination") to convert the raw water's hydrogen sulphide, iron and manganese into filterable oxide particles Ferric chloride addition to optimize hydrogen sulphide removal (at Merritt & Dunn's) Filtration in a pressure filter Disinfection of the filter effluent with chlorine gas or sodium hypochlorite ("post-chlorination") An additional distribution chlorine monitoring analyzer is located at the water tower. In case of a power outage, standby diesel generators will start automatically at three of the WTFs (Merritt, Thompson & Dunn's).	
Innerkip Drinking Water System		
Location	Community of Innerkip, East Zorra – Tavistock Township	
O.Reg. 170/03 Classification	Large Municipal Residential Water System	
Production well(s)	**Well 1**	**Well 2**
Date of Installation	2002	2002
Depth	34.5 m	35.4 m
Maximum Flowrate	20 L/s	15 L/s
Overburden/Bedrock	Bedrock	Bedrock
GUDI Status	Secure Groundwater	Secure Groundwater
Water Treatment location(s)	Innerkip WTF & Standpipe - 715572 Oxford Rd 4	
Treatment Method	Filtration for iron and Manganese removal and disinfection	
Process Summary	Raw water is extracted with submersible pumps and flow metered Sodium hypochlorite is first added to oxidize the iron and manganese in the raw water. The water is conveyed to two pressure filters to remove the iron and manganese particulates and additional sodium hypochlorite is injected for disinfection purposes. The chemical feed system consists of a day tank and three chemical pumps (2 duty, 1 standby). Chlorine contact time is normally achieved in the 700 m^3 storage standpipe. If the standpipe is bypassed, the continuous chlorine analyzer at the point of entry to distribution may be fitted with a sample line contact loop which simulates retention time within the watermain to ensure the residual free chlorine concentration meets CT requirements.	

	High lift pumps convey treated water from the storage standpipe to the distribution system. Two hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. Backwashing of the filter to remove particle build-up occurs automatically based on run time or head loss through the filter. Backwash water is stored in two on-site lagoons with a gravity discharge to the adjacent creek. The discharge is monitored for TSS in accordance with the DWWP for the system. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. An additional distribution chlorine monitoring analyzer is located at the Aldergrange Ave Monitoring Station. A standby diesel generator will start automatically in case of a power outage.	
Lakeside Drinking Water System		
Location	Community of Lakeside, Zorra Township	
O.Reg. 170/03 Classification	Small Municipal Residential Water System	
Production well(s)	**Well 2**	
Date of Installation	2	
Depth	106 metres below ground surface	
Overburden/Bedrock	Bedrock	
GUDI Status	Secure Groundwater	
Water Treatment location(s)	Lakeside WTF & Elevated Water Storage - 923278 Road 92 (378 Queen St)	
Treatment Method	Disinfection and iron sequestration	
Process Summary	The raw water is extracted with a submersible pump and flow metered. Sodium hypochlorite for disinfection and sodium silicate for iron sequestration are injected upstream of a 162m3 storage standpipe. The chlorination system consists of a day tank and two chemical feed pumps, both duty. The sequestration is used to prevent the iron from precipitating within the distribution system and consists of a chemical feed pump and a day tank. High lift pumps then convey the water into a chlorine contact pipe which provides the necessary CT and a backup post-chlorination system consisting of a day tank and two chemical feed pumps is available to provide secondary disinfection as required. Six hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A standby diesel generator will start automatically in case of a power outage.	
Mt. Elgin Drinking Water System		
Location	Community of Mount Elgin, South West Oxford Township	
O.Reg. 170/03 Classification	Large Municipal Residential Water System	
Production well(s)	**Well 3A**	**Well 5**
Date of Installation	2011	1990
Depth	60.9m	60 metres below ground surface
Overburden/Bedrock	Bedrock	Bedrock

GUDI Status	Secure Groundwater	Secure Groundwater
	Mt. Elgin WTF	333271 Plank Line
Water Treatment location(s)	Graydon WTF	324062 Mount Elgin Road
Treatment Method	Disinfection only	
Process Summary	At the Mt Elgin WTF Raw water is extracted with a submersible pump and flow metered. Sodium hypochlorite for disinfection is injected upstream of a 420 m^3 storage reservoir which provides the necessary CT. The chlorination system consists of a day tank and two chemical feed pumps, one duty and one standby. High lift pumps then convey the water to the distribution system. Six hydro-pneumatic pressure tanks smooth out pressure fluctuations and reduce start/stop cycling of the high lift pumps. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A standby diesel generator will start automatically in case of a power outage. At the Graydon WTF Raw water is extracted with a submersible pump and flow metered. The water at the Well 5 WTF is treated with carbon dioxide to reduce raw water pH which converts sulphide present in the raw water to dissolved hydrogen sulphide. Hydrogen sulphide and methane are then via two Liqui-Cel® membrane degasser units operated in series and final disinfection with sodium hypochlorite. Disinfection with sodium hypochlorite also oxidizes any remaining hydrogen sulphide. The chlorination system consists of a day tank and two chemical feed pumps, one duty and one standby. Sodium hydroxide is then used to increase the pH as required to match Well 3A pH. Following the chlorine contact pipe the treated water is conveyed directly to the distribution system A standby natural gas will start automatically in case of a power outage.	

Oxford South Drinking Water System			
Location	Communities of Norwich, Otterville & Springford, Township of Norwich		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Norwich Well N2**	**Norwich Well N4**	**Norwich Well N5**
Date of Installation	Rebuilt in 2008	1997	2008
Depth	34.1 m	26.1	39.9
Maximum Flowrate	18.9L/s	26.5L/s	9.5L/s
Overburden/Bedrock	Bedrock	Bedrock	Bedrock
GUDI Status	Secure Groundwater	Secure Groundwater	Secure Groundwater

Production well(s)	**Otterville Well O3**	**Otterville Well O4**
Date of Installation	1989	1990
Depth	12.8 m	13.1 m
Maximum Flowrate	7.6 L/s	7.6 L/s
Overburden/Bedrock	Overburden	Overburden
GUDI Status	Secure Groundwater	Secure Groundwater

Production well(s)	**Springford Well S4**	**Springford Well S5**
Date of Installation	2000	2002
Depth	23.8 m	25.9 m
Maximum Flowrate	3.0 L/s	3.0 L/s
Overburden/Bedrock	Overburden	Overburden
GUDI Status	Secure Groundwater	Secure Groundwater
Water Treatment location(s)	Norwich Main St. WTF	135 Main St. W.
	Norwich Pitcher St. WTF	6 Pitcher St.
	Otterville WTF	225687 Otterville Road
	Springford WTF	592611 Oxford Rd # 13 (West St)
Treatment Method	Disinfection and iron sequestration (Norwich Well 4), Disinfection and filtration for iron removal (Norwich Wells 2 and 5) and Disinfection only at Otterville and Springford Wells	
Process Summary	At the Norwich Main Street WTF (Well 4) Raw water is extracted with submersible pumps and flow metered. Sodium hypochlorite for disinfection and sodium silicate for iron sequestration are injected upstream of a chlorine contact pipe. Following the chlorine contact pipe the treated water is conveyed directly to the distribution system. .A standby mobile generator is available in case of power outage. At the Norwich Pitcher Street WTF (Wells 2, 5) Raw water is extracted by submersible pumps, flow metered and conveyed to the filtration system. Sodium hypochlorite is injected to oxidize iron prior to the water entering one of 2 pressure filters. After filtration, additional sodium hypochlorite is added for disinfection and the water is directed to the water tower. A chlorine contact pipe is installed to allow for sufficient CT when the Tower is out of service for repairs or maintenance. Backwashing of the filter to remove particle build-up occurs automatically based on run time or head loss through the filter with the backwash water discharged to the sanitary sewers. Each chemical feed system has 2 feed pumps and draws from a common storage tank.. A standby diesel generator will start automatically in case of a power outage. At the Otterville WTF Raw water is extracted with submersible pumps and flow metered. Sodium hypochlorite for disinfection is injected upstream of a chlorine contact main. Each well has its own dedicated chemical feed pump, and the two feed pumps draw from one common feed tank. Treated water is conveyed directly from the contact main to the distribution system. A standby diesel generator will start automatically in case of a power outage. At the Springford WTF Raw water is extracted with submersible pumps and flow metered. Sodium hypochlorite for disinfection is injected upstream of chlorine contact pipe. The chlorination system consists of each well having its own dedicated feed pump, and drawing from one common feed tank. Treated water is conveyed directly from the contact main to the distribution system. The Norwich distribution system consists of the following components: A 3.5 km long transmission main connecting Otterville to Springford A 9 km long transmission main connecting Otterville to Norwich	

	The Norwich elevated water storage tower provides CT for the Pitcher St. WTF and in-distribution storage. The water tower in Otterville provides storage. The level in the Otterville tower controls when various wells start and stop as well as the supply of water from Norwich. An automated valve allows water from Norwich to enter the Springford-Otterville area of the system. The water towers maintain pressure in the event of a power outage. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. An additional distribution chlorine monitoring analyzer is located at the Sutton St. Lift Station in Norwich and the Otterville Water Tower. Nitrates are also monitored with an online analyzer in Otterville.		
Plattsville Drinking Water System			
Location	Community of Plattsville, Blandford-Blenheim Township		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Well 1**	**Well 2**	
Date of Installation	1979	1979	
Depth	16.5 m	17.1 m	
Maximum Flowrate	26.5 L/s	26.5 L/s	
Overburden/Bedrock	Overburden	Overburden	
GUDI Status	Secure Groundwater	Secure Groundwater	
Water Treatment location(s)	926689 Oxford Rd.42 (73 Albert St. W.)		
Treatment Method	Disinfection and iron sequestration		
Process Summary	Raw water is extracted by submersible pumps and flow metered. Sodium hypochlorite for disinfection and sodium silicate for iron sequestration are injected upstream of a chlorine contact pipe. The chlorination system consists of a day tank and two chemical feed pumps, both duty. The sequestration is used to prevent the iron from precipitating within the distribution system and consists of two chemical feed pumps, one standby, one duty and a day tank. Well pumps convey the water into a chlorine contact pipe which provides the necessary CT and into the distribution system. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A distribution chlorine monitoring analyzer is located at the water tower. In case of a power outage, a mobile generator will power the facility and pressure is maintained by the elevated storage tower.		
Tavistock Drinking Water System			
Location	Community of Tavistock, East Zorra – Tavistock Township		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Well 1**	**Well 2A**	**Well 3**
Date of Installation	1967	1991	1995
Depth	19.5 m	48 m	47.5 m
Maximum Flowrate	15L/s	32L/s	50L/s
Overburden/Bedrock	Overburden	Bedrock	Bedrock

GUDI Status	Secure Groundwater	Secure Groundwater	Secure Groundwater	
Water Treatment location(s)	18 Hendershot St			
Treatment Method	Disinfection and iron sequestration			
Process Summary	The treatment facility is located in the base of the Water Tower with the groundwater wells located in the same general vicinity. Wells 2A and 3 do not normally operate together. Raw water is extracted by submersible pumps and flow metered. Sodium hypochlorite for disinfection and sodium silicate for iron sequestration are injected upstream of the water storage tower. Contact Time is achieved within the water tower. A chlorine contact pipe is installed to allow for sufficient CT when the Tower is out of service for repairs or maintenance. The chlorination system consists of a day tank and two chemical feed pumps, both duty. The sequestration is used to prevent the iron from precipitating within the distribution system and consists of one chemical feed pump and a day tank. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. A distribution chlorine monitoring analyzer is located at the William St. S Lift Station. A standby diesel generator will start automatically in case of a power outage			
Thamesford Drinking Water System				
Location	Community of Thamesford, Zorra Township			
O.Reg. 170/03 Classification	Large Municipal Residential Water System			
Production well(s)	**Well 1**	**Well 2**	**Well 4**	**Well 3**
Date of Installation	1979	1987	2019	1998
Depth	14.6 m	9.4 m	14 m	107 m
Maximum Flowrate	26.5 L/s	26.5 L/s	26.5 L/s	15.1 L/s
Overburden/Bedrock	Overburden	Overburden	Overburden	Bedrock
GUDI Status	GUDI	GUDI	GUDI	Secure Groundwater
Water Treatment location(s)	202 Stanley St			
Treatment Method	Disinfection and filtration			
Process Summary	Raw water is extracted with submersible pumps and flow metered. At the River Wells Pumphouse sodium hypochlorite is added to oxidize the manganese in the raw water. A 1.5 km long transmission main connects the River wells to the main treatment facility. For Well 3, sodium hypochlorite is added upstream of the filters. At the WTF, water from all four wells blends and enters the three pressure filters to remove iron and manganese. Following filtration, the water is disinfected by Ultra Violet irradiation through one of two UV reactors and is discharged into a treated water storage reservoir. Sodium hypochlorite is added for secondary disinfection purposes once the water leaves the UV reactors. High lift pumps convey the water to the elevated water storage tower located adjacent to the WTF. On-line equipment continuously monitors water flow, pressure, turbidity and residual free chlorine. Unacceptable chlorine levels and analyzer malfunction will lock out the well pump and cause an alarm to be dialed out. An additional distribution chlorine monitoring analyzer is located at the Hossack Monitoring Station.			

	A standby diesel generator that will start automatically in case of a power outage is located at the WTF and at the River Wells Pumphouse.			
Tillsonburg Drinking Water System				
Location	Town of Tillsonburg			
O.Reg. 170/03 Classification	Large Municipal Residential Water System			
Production well(s)	**Well 1A**	**Well 2**	**Well 6A** (offline)	
Date of Installation	1974	1981	1990	
Depth	26.5m	26.5m	35.1	
Maximum Flowrate	26.5L/s	15.2L/s	15.2L/s	
Overburden/Bedrock	Overburden	Overburden	Overburden	
GUDI Status	GUDI	GUDI	Secure Groundwater	
Production well(s)	**Well 4**	**Well 5**	**Well 7A**	
Date of Installation	1974	1981	1990	
Depth	26.5m	26.5m	35.1	
Maximum Flowrate	26.5L/s	15.2L/s	15.2L/s	
Overburden/Bedrock	Overburden	Overburden	Overburden	
GUDI Status	GUDI	GUDI	Secure Groundwater	
Production well(s)	**Well 9**	**Well 10**	**Well 11**	**Well 12**
Date of Installation	1988	1988	1991	1994
Depth	24.69m	24.69m	23.82m	25.0m
Maximum Flowrate	15.2.L/s	15.2L/s	15.2L/s	14.8L/s
Overburden/Bedrock	Overburden	Overburden	Overburden	Overburden
GUDI Status	GUDI	GUDI	GUDI	Secure Groundwater
Water Treatment location(s)	Fairview WTF & Booster	58 Langrell Ave		
	Mall Road WTF	200 Mall Road		
	Plank Line WTF	332415 Plank Line, Hwy #19 North		
	Bell Mill Sideroad WTF	1392 Bell Mill Sideroad		
	Rokeby Road WTF	165 Rokeby Side Road		
Treatment Method	Disinfection and filtration			
Process Summary	The Tillsonburg Well Supply system has six points of entry (POE) into the distribution system. Each POE provides treatment for different wells depending on their characteristics. The water level within the main reservoir controls when individual WTFs are called to operate. On-line continuous chlorine residual and turbidity analyzers monitor the treated water entering the distribution system. Distribution chlorine monitoring analyzers are located at the Plank Line Reservoir discharge and Broadway Street WTF. Nitrates are monitored with on-line nitrate analyzers at North St. Pumphouse and Fairview WTF. The system's in distribution at-grade storage reservoir is located north of the Town and provides 9,100 m^3 of storage.			

	Standby diesel generators that will start automatically in case of a power outage are located at the Mall Road WTF, Bell Mill Sideroad WTF, and the Fairview WTF. Portable generators can be used at other locations if necessary. Mall Road WTF (Wells 1A & 2) Raw water is flow metered and injected with chlorine for oxidation of iron. The water then enters one of three pressure filters to remove the iron particulate. Following the filters, the water is disinfected with Ultra Violet irradiation through one of two UV reactors. Once the water leaves the UV units, chlorine is then added to provide secondary disinfection and the water is discharged to an on-site treated water storage reservoir. High lift pumps convey the water into the distribution system. Fairview WTF (Wells 4 ,5, and 7A) Raw water from Well 7A is flow metered and chlorinated at the Broadway Street pumphouse. Raw water from Wells 4 and 5 is flow metered and chlorinated at the North Street pumphouse and conveyed to a local reservoir. Water from North Street and Broadway Street Pumphouses is conveyed to the Fairview WTF through an interconnected raw watermain. High lift pumps convey the water through a dedicated transmission main which then transports the water to the WTF. The water is disinfected with ultraviolet (UV) irradiation through one of two UV reactors. Secondary disinfection is provided in the form of sodium hypochlorite. The WTF can operate under three different modes. Treated water from the UV units can be boosted through pumps and discharged to the high pressure zone or to the main pressure zone. Alternately, treated water from the main pressure zone can enter the facility and be boosted and discharged to the high pressure zone. Plank Line WTF (Well 6A) (offline) Raw water is flow metered and chlorinated for disinfection. The water is then conveyed into a dedicated transmission main which provides the required contact time and discharges at the Plank Line Reservoir. Plank Line Reservoir & Control Building Water is flow metered and can be chlorinated to ensure adequate residual. The water is then discharged into the Plank Line Reservoir. Bell Mill Sideroad WTF (Wells 9, 10 & 11) Raw water is flow metered and injected with chlorine for oxidation of iron. The water then enters one of three pressure filters to remove the iron particulate. Following the filters, the water is disinfected with Ultra Violet irradiation through one of two UV reactors. Once the water leaves the UV units, chlorine is then added to provide secondary disinfection and the water is discharged to an on site treated water storage reservoir. High lift pumps convey the water into the distribution system. Rokeby Road WTF (Well 12) Raw water is flow metered and chlorinated for disinfection. The water is conveyed into a dedicated contact pipe and transmission main which is connected to the distribution system.		
Woodstock Drinking Water System			
Location	City of Woodstock		
O.Reg. 170/03 Classification	Large Municipal Residential Water System		
Production well(s)	**Well 2**	**Well 4**	**Well 6**
Date of Installation	1945	1958	1931
Depth	20.8m	23.5m	48.8m

Maximum Flowrate	115L/s	115L/s	52L/s
Overburden/Bedrock	Overburden	Overburden	Bedrock
GUDI Status	GUDI	GUDI	Secure Groundwater
Production well(s)	**Well 1**	**Well 3**	**Well 5**
Date of Installation	1945	1945	1962
Depth	29.4m	16.6m	27.1m
Maximum Flowrate	105L/s	32L/s	68L/s
Overburden/Bedrock	Overburden	Overburden	Overburden
GUDI Status	GUDI	GUDI	GUDI
Production well(s)	**Well 8**	**Well 11**	**Well 7**
Date of Installation	1966	1993	1956
Depth	14.6m	31.87m	62.5m
Maximum Flowrate	37L/s	45L/s	45.0L/s
Overburden/Bedrock	Overburden	Overburden	Bedrock
GUDI Status	GUDI	Secure Groundwater	Secure Groundwater

Production well(s)	**Well 9**	**Well 12**
Date of Installation	1978	2009
Depth	62.6m	47.55m
Maximum Flowrate	15L/s	26L/s
Overburden/Bedrock	Bedrock	Overburden
GUDI Status	Secure Groundwater	Secure Groundwater

Water Treatment location(s)	Thornton WTF location	484981 Sweaburg Rd., Southwest Oxford Township
	Sutherland Park WTF location	651 Sutherland Drive, Woodstock
	Southside WTF location	221 Victoria St. S Woodstock
	Trillium Line WTF	454350 Trillium Line, Southwest Oxford Township
Treatment Method	Disinfection only except for filtration for hydrogen sulphide removal at Well 7	
Process Summary	The Woodstock system has four treatment facilities which feed the distribution system. On-line continuous chlorine residual and turbidity analyzers monitor the treated water entering the distribution system. Additional distribution chlorine monitoring analyzers are located at the Sweaburg Monitoring Station, Athlone & Nellis Booster Stations and both water towers. Nitrates are also monitored with an on-line nitrate analyzer at Thornton WTF. Standby diesel generators that will start automatically in case of a power outage are located at the Southside WTF, Thornton WTF, Tabor Wells (2 & 4), and the Athlone and Nellis Booster Stations. Portable generators can be used at other locations if necessary. The Trillium Line WTF (Well 12)	

	Sodium hypochlorite is injected upstream of a chlorine contact pipe which provides the necessary CT before water enters the Sweaburg distribution system. Excess water from this WTF flow to Bower Hill Reservoir through the transmission main leaving Thornton WTF. Thornton WTF The majority of the City's supply comes from the WTF located southwest of the City. Seven wells, six of which are GUDI sources, supply the facility. Wells 2 and 4 are connected to the facility through a 2.6 km long transmission main. Wells 1, 3, 5, 8 and 11 are located on the WTF property. Raw water is disinfected by ultra violet irradiation and chlorination before discharging to an on-site storage standpipe. Three different pumping configurations can feed the water to the Sweaburg distribution system, the Bower Hill reservoir or the Southside WTF reservoir. CT is achieved in the transmission mains leaving the Thornton WTF. The Southside WTF Post-chlorinates water from Thornton WTF and wells 6 and 9 if necessary. Well 6 is located on the Southside WTF property and Well 9 is connected by a 1.58 km long transmission main. Water from the two wells is chlorinated and CT is provided for well 9 in the transmission main and for well 6 in a baffled cell within the Southside reservoir. The reservoir provides 1620 m3 of storage and high lift pumps convey the treated water to the distribution system. The Sutherland Park WTF Provides treatment for well 7. The raw water is aerated to oxidize hydrogen sulphide and chlorinated prior to entering the on-site reservoir, where CT is achieved. Treated water is pumped by high lifts and filtered to remove the sulphur and iron particulates before it enters the distribution system. There are three main storage facilities within the distribution system. The Bower Hill reservoir consists of three separate below-ground concrete reservoirs with nominal capacities of 0.8 (offline), 1.2 and 2.0 MG (million Imperial gallons). It is located at the west end of the City and controls the pumping requirements for all of the supply facilities. The 5300m^3 water tower located at the east end of the City provides storage for the Nellis and Commerce Way boosted pressure zone. The 3600m^3 water tower in the northwest corner of the City provides storage for properties north of the Thames River. There are three separate pressure zones within the City. The majority of the City operates off of the main pressure zone controlled by the Bower Hill reservoir. The Athlone Booster Station provides an elevated pressure to the southwest corner of the City. The North Pittock, Nellis and Commerce Way Booster Stations provide increased pressures to the east portion of the City. The Thornton WTF and Trillium Line WTF regulate pressure in the distribution system in the community of Sweaburg, outside of the City of Woodstock.

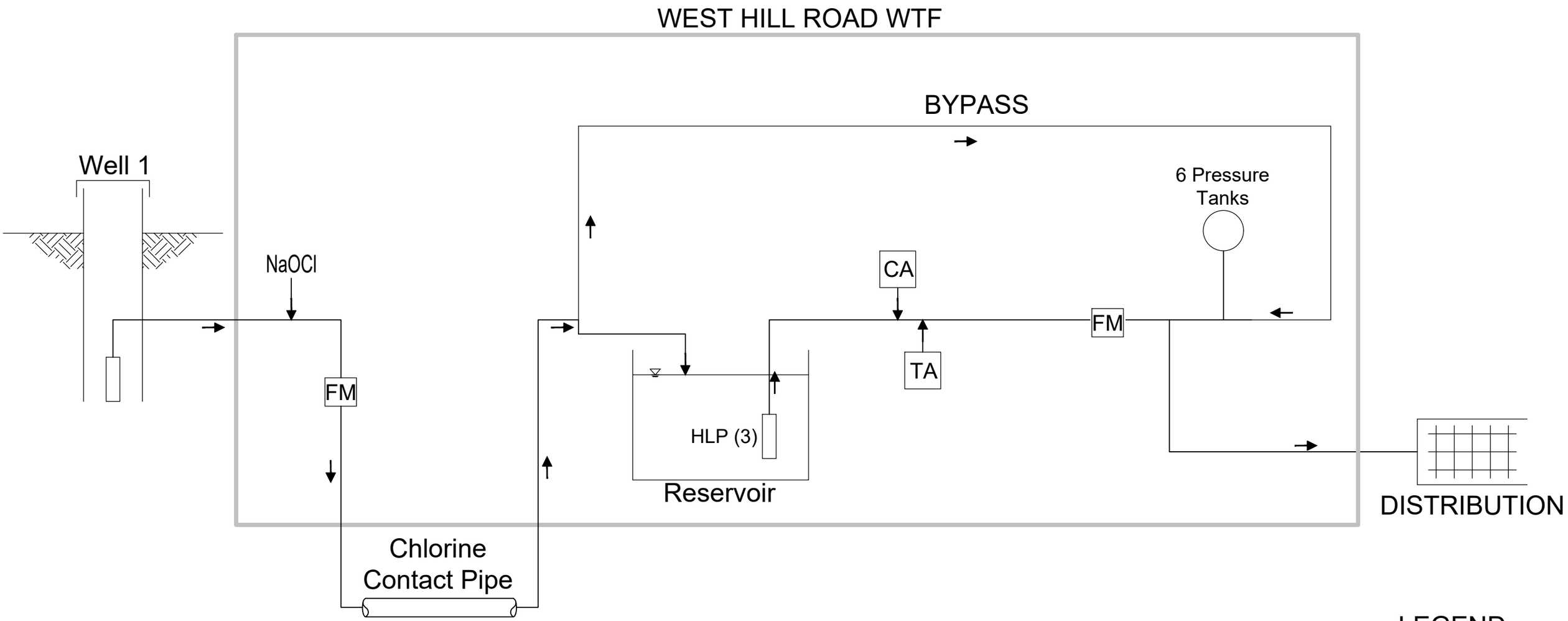
APPENDIX IV - PROCESS FLOW CHARTS

Beachville Drinking Water System
Bright Drinking Water System
Brownsville Drinking Water System
Dereham Centre Drinking Water System
Drumbo - Princeton Drinking Water System
Embro Drinking Water System
Hickson Drinking Water System
Ingersoll Drinking Water System
Innerkip Drinking Water System
Lakeside Drinking Water System
Mt. Elgin Drinking Water System
Oxford South Drinking Water System
Plattsville Drinking Water System
Tavistock Drinking Water System
Thamesford Drinking Water System
Tillsonburg Drinking Water ~~Supply~~ System
Woodstock Drinking Water ~~Supply~~ System

Note: Updates to process flow charts do not require a revision of the Operational Plan. However, updated charts shall be included in this Plan Appendix when they are issued. Process flow charts have their own revision control noted in the title block of each drawing.

Beachville

West Hill Road WTF



LEGEND

CA ~ Chlorine Analyzer

FM ~ Flowmeter

TA ~ Turbidity Analyzer

HLP ~ High Lift Pump

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WOODSTOCK, ONT.
N4S-3G1
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www.county.oxford.on.ca

Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: BEACHVILLE PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
5	08/16/16	Revised Distribution Line; Moved Sodium Hypochlorite Injection Point	V.A.V.
4	05/26/14	Resymbolized Bypass Pipe	C.S.
3	03/18/14	Added Building Outline; Moved Chlorine Contact Pipe	V.A.V.
2	09/04/12	Updated facility name	V.A.V.
1	12/05/11	Added Sodium Hypochlorite Injection Point	V.A.V.
0	09/15/08	Transfer to CAD	V.A.V.

Bright

LEGEND

CA ~ Chlorine Analyzer
FM ~ Flowmeter
TA ~ Turbidity Analyzer
HLP ~ High Lift Pump
~ Centrifugal Pump

Well 4A

CUTHBERTSON ST. PUMPHOUSE

FM

Pressure Tanks (1)

NaOCl

Chlorine Contact Pipe

Sodium Silicate

NaOCl

Well 5

FM

WILSON STREET WTF

RESERVOIR BYPASS

NC

NC

CA

CA

TA

FM

Pressure Tanks (4)

NC

FM

HLP (3)

Reservoir

STANDPIPE

Cuthbertson St. Pumphouse

CA

DISTRIBUTION

REV #	DATE	REVISIONS & ADDITIONS	BY
10	09/23/21	Added Valve at Reservoir	D.S.K.
9	01/31/20	Sodium Silicate an NaOCl reloaction	D.C.A.
8	08/22/19	General Update and revisions	D.C.A.
7	08/16/16	Added gate valve & centrifugal pump	V.A.V.
6	08/04/16	Revised Standpipe capacity, moved Flowmeter	V.A.V.
5	12/07/15	Added Pressure Tank & Chlorine, Flowmeter Analyzer	Z.S.
4	09/04/12	Added facility names and future standpipe	V.A.V.
3	12/05/11	Removed Well 4, Moved Sodium Hypochlorite Injection Points	V.A.V.
2	05/26/14	Re symbolized bypass pipe and updated building lines	C.V.
1	05/16/14	Revised Facility names, adjusted and added building lines	C.V.

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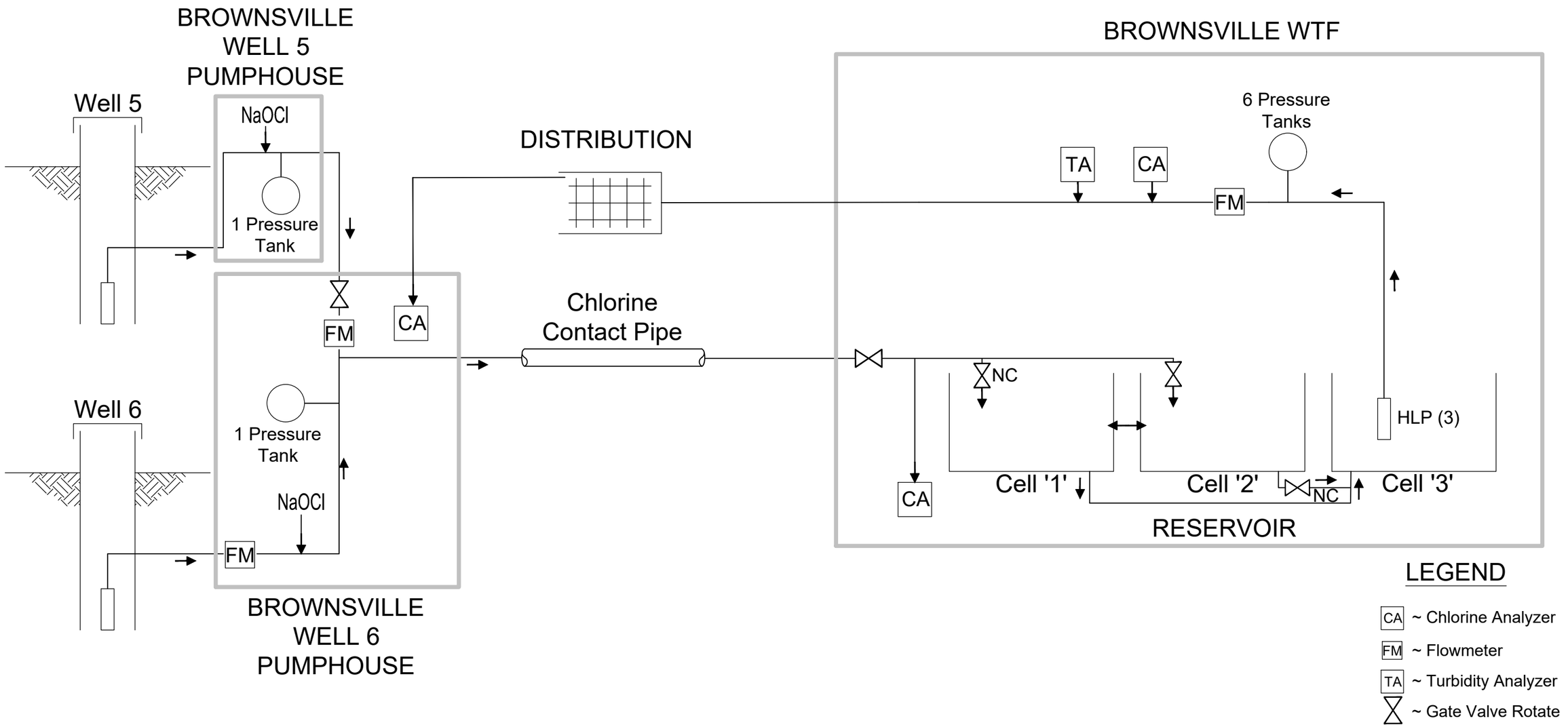
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: BRIGHT PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Brownsville



LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- ~ Gate Valve Rotate

REV #	DATE	REVISIONS & ADDITIONS	BY
0	10/27/14	Removed inlet flow meter	C.V.
1	05/20/14	Revised facility and resevoir names	C.V.
2	05/20/14	Completed redline revisions to WTF schematics as indicated	C.V.
3	05/20/14	Moved distribution network, added 2 CA's to Well 6 Pumphouse	C.V.
4	05/20/14	Created building lines and added P-Tanks to Pumphouse 5 & 6	C.V.
5	09/23/21	Added valves at reservoir	D.S.K.
6	06/20/22	Moved CA location	A.J.L.

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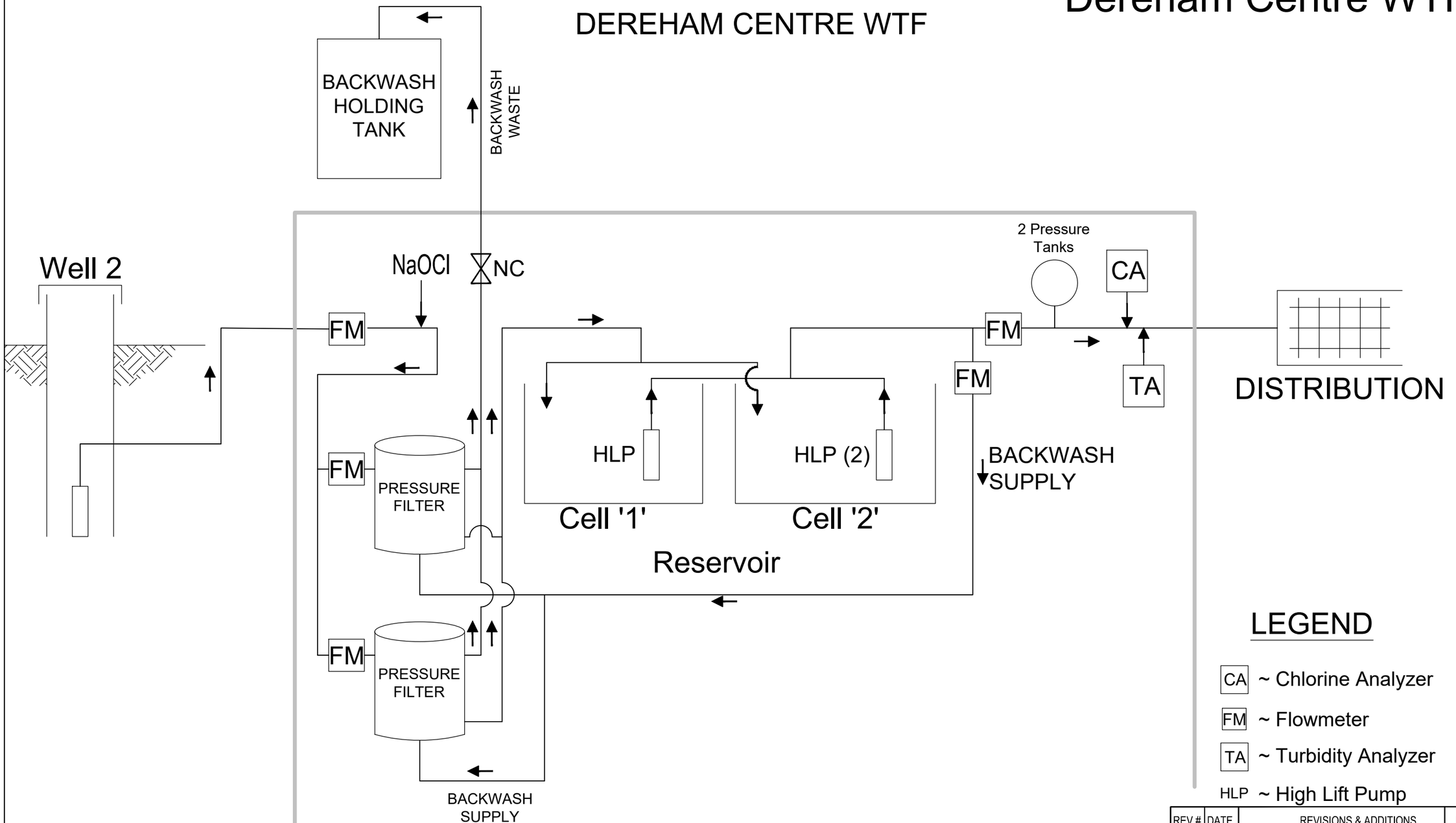
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: BROWNSVILLE PROCESS DIAGRAM	File Location: file: X:\PUBLIC WORKS\FACILITIES\A09 DWQMS Process Diagrams\ DWQMS.dwg Layout: Brownsville date: Jun 20, 2022 08:33 user: alaCroix
Scale: N.T.S.	Drawn By: Deborah Goudreau

Dereham Centre WTF

DEREHAM CENTRE WTF



LEGEND

CA ~ Chlorine Analyzer

FM ~ Flowmeter

TA ~ Turbidity Analyzer

HLP ~ High Lift Pump

REV #	DATE	REVISIONS & ADDITIONS	BY
0	09/15/08	TRANSFER TO CAD	V.A.V.
1	04/16/09	LABELED RESERVOIRS	V.A.V.
2	04/16/09	Added Building Outline	V.A.V.
3	03/18/14	Added cross over in Cell 2	C.V.
4	05/26/14	Added Back Wash Tank and Pressure Filter	D.C.A.
5	09/28/21	Removed Sodium Silicate, Show both Pressure Filters	D.S.K.
6	01/10/22	Removed Valve	A.J.L.
7	01/20/22	Removed Piping	A.J.L.

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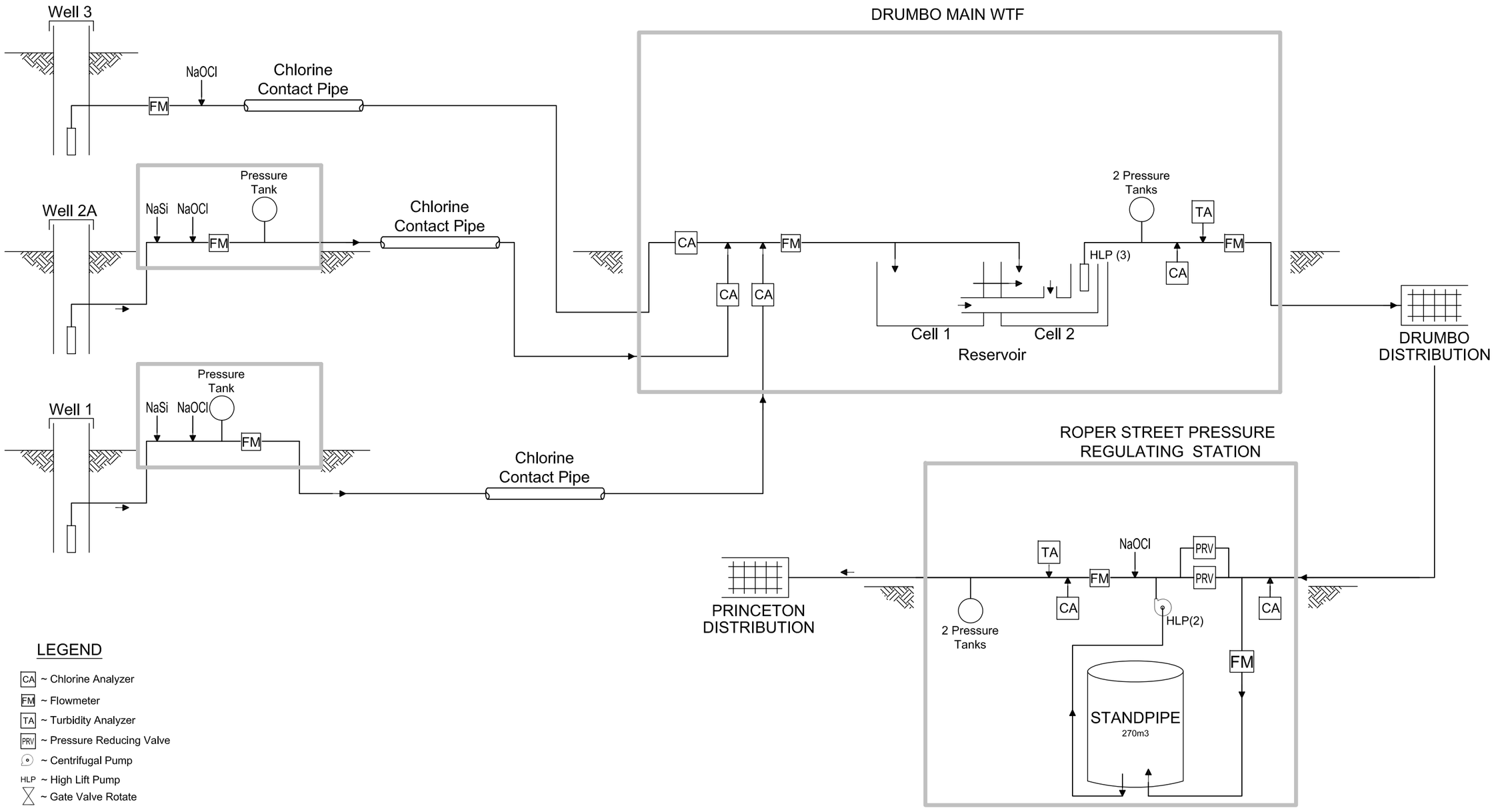
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: DEREHAM CENTRE PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Drumbo / Princeton



LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- PRV ~ Pressure Reducing Valve
- ~ Centrifugal Pump
- HLP ~ High Lift Pump
- ~ Gate Valve Rotate

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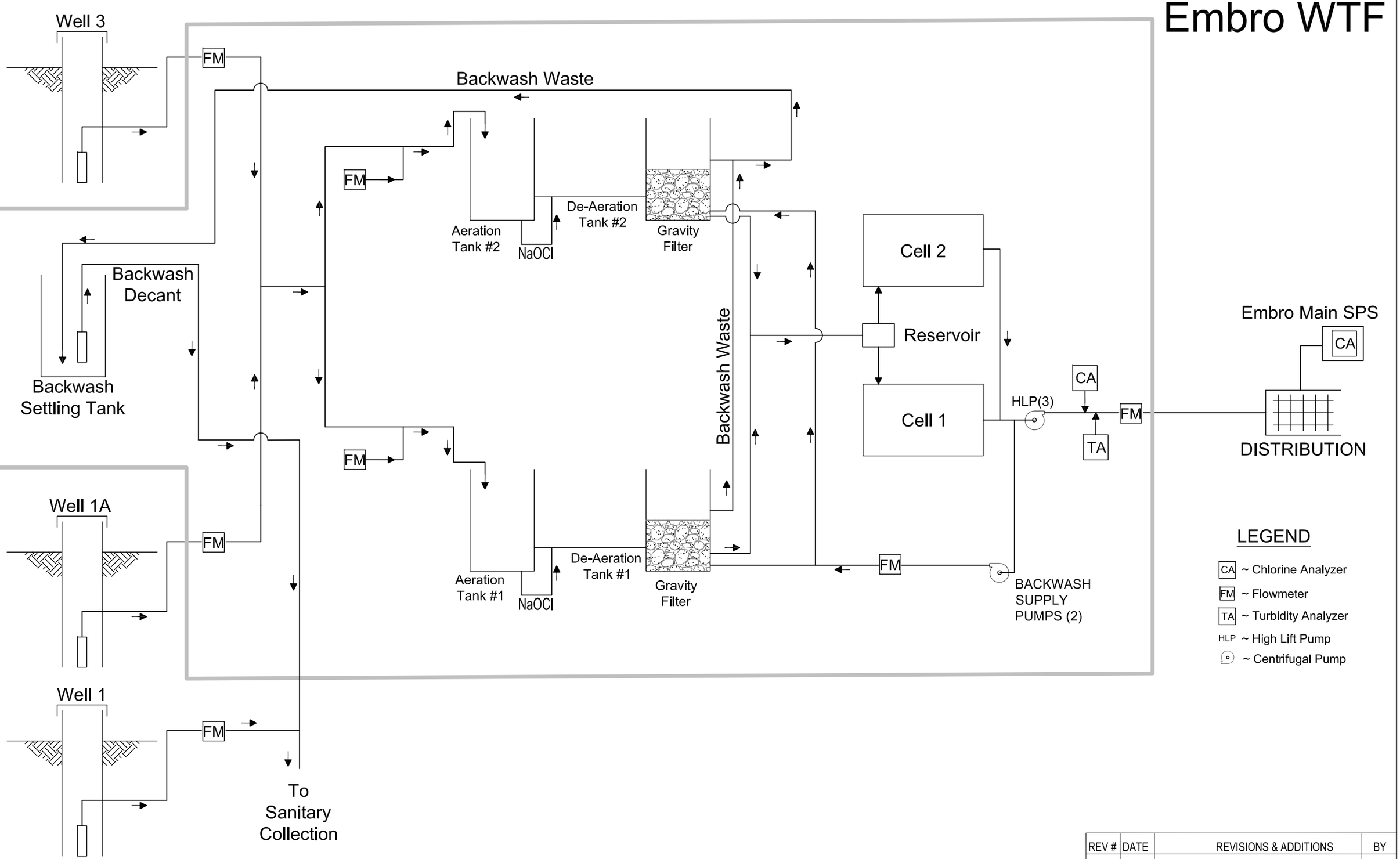
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: DRUMBO PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\A09 DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
10	09/23/21	Added flow direction	D.S.K.
9	09/22/19	General Updates	D.C.A.
8	08/16/16	Deleted Sodium Hypochlorite Injection Point in Drumbo, Added Standpipe Size	V.A.V.
7	07/29/16	Added 2 Pressure Tanks & Flow Meter to Roper Steet	V.A.V.
6	12/07/15	Added Turbidity Analyzer & Removed Gate Valves	Z.S.
5	05/23/14	Added 2 Gate Valves to Drumbo Main WTF, revised bldg outlines	C.V.
4	03/19/14	Revised Reservoir, Added PRV, Added/Removed CA	C.V.
3	08/16/12	Updates	V.A.V.

Embro WTF



LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- HLP ~ High Lift Pump
- ~ Centrifugal Pump

REV #	DATE	REVISIONS & ADDITIONS	BY
10	09/23/21	General Updates	D.S.K.
9	11/18/20	Flowmeter Relocation	D.C.A.
8	08/22/19	General Updates	D.C.A.
7	04/12/18	Revised piping at Reservoir	V.A.V.
6	07/12/15	Added Main SPS & Removed Filter Anthracite	Z.S.
5	11/28/14	Added FM to Well #1	C.V.
4	03/24/14	Revised piping layout & backwash, Removed Well 1	V.A.V.
3	09/04/12	Removed well 1, added flowmeter to future connection	V.A.V.
2	12/07/11	Added well 1A & 2 backwash pumps	V.A.V.

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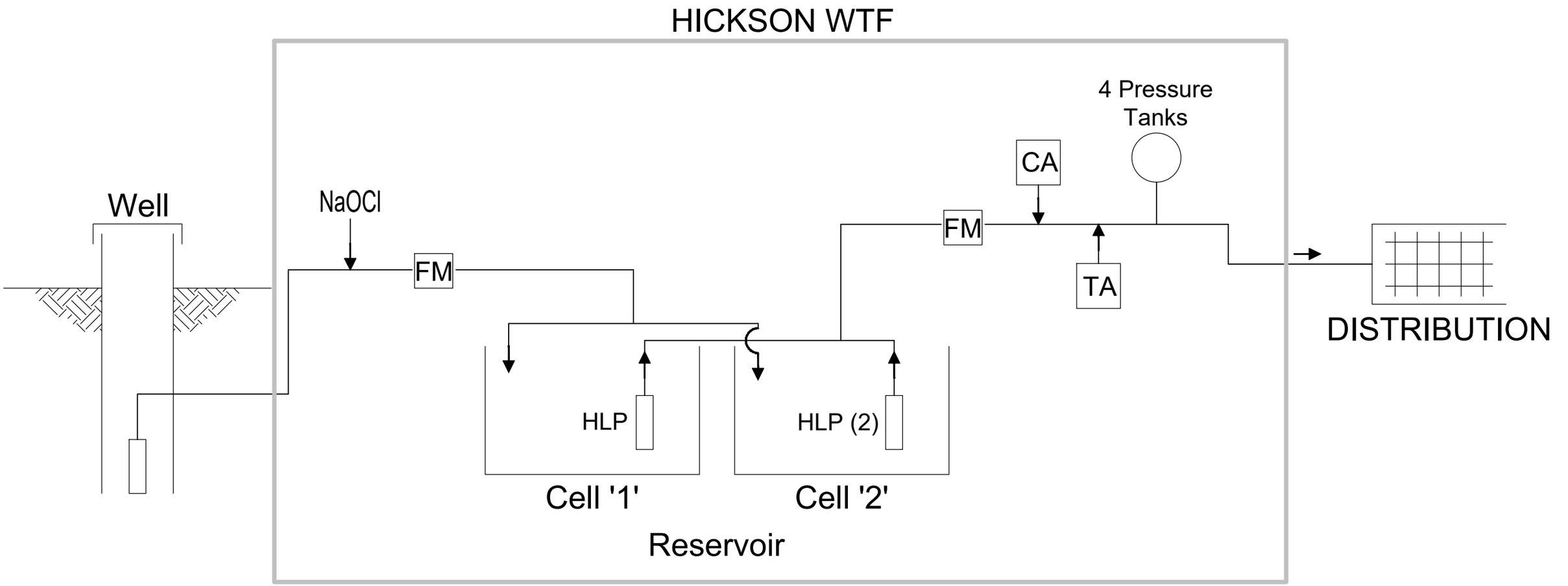
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: EMBRO PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Hickson WTF



LEGEND

CA ~ Chlorine Analyzer

FM ~ Flowmeter

TA ~ Turbidity Analyzer

HLP ~ High Lift Pump

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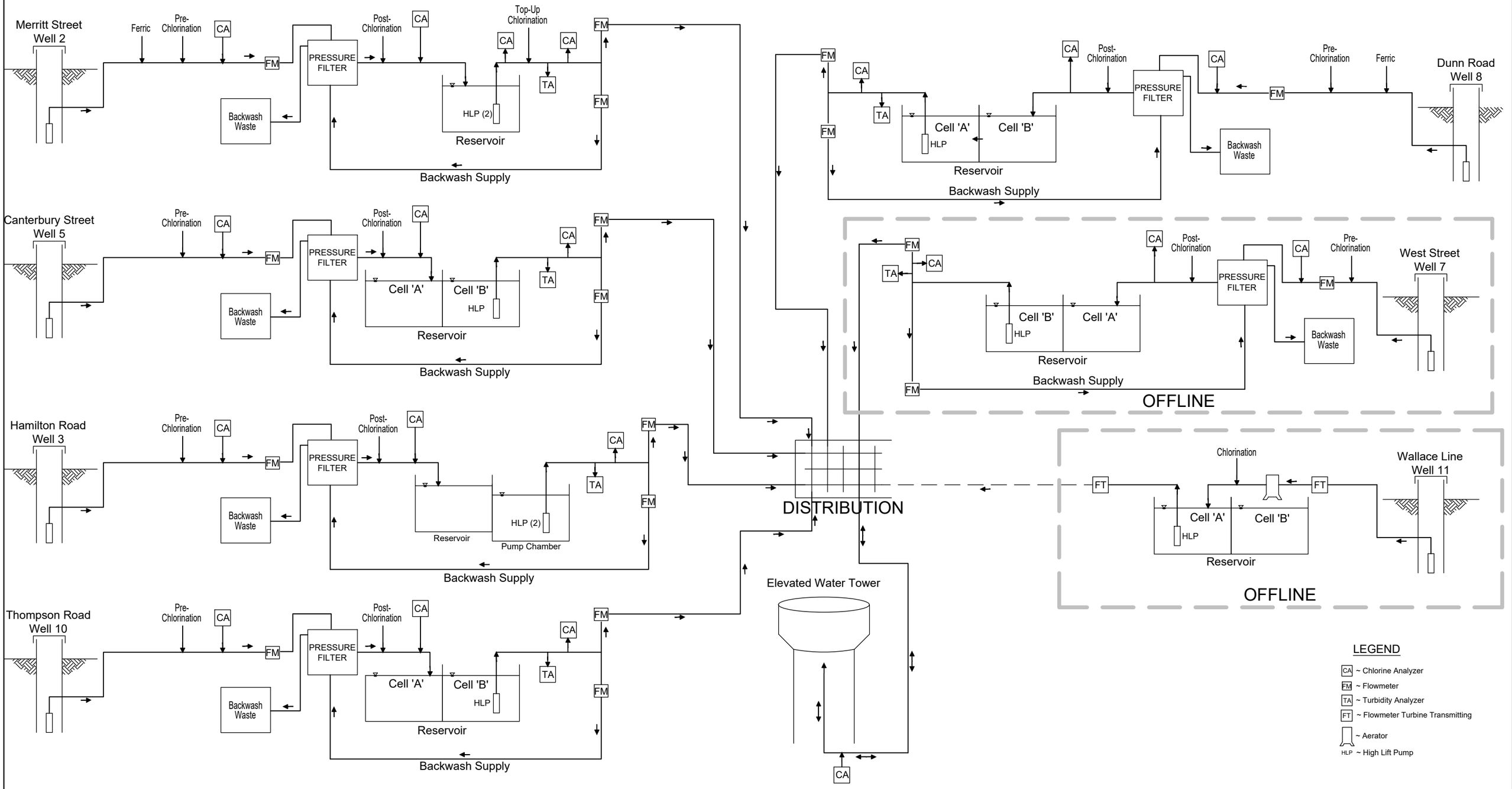
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: HICKSON PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
0	09/15/08	TRANSFER TO CAD	V.A.V.
1	04/16/09	REVISED TO SHOW 2 RESERVOIRS INSTEAD OF 1	V.A.V.
2	03/24/14	Added Building Outline	V.A.V.
3	21/05/14	Removed Sodium Cilicate before Resevoir	C.V.

Ingersoll



LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- FT ~ Flowmeter Turbine Transmitting
- ~ Aerator
- HLP ~ High Lift Pump

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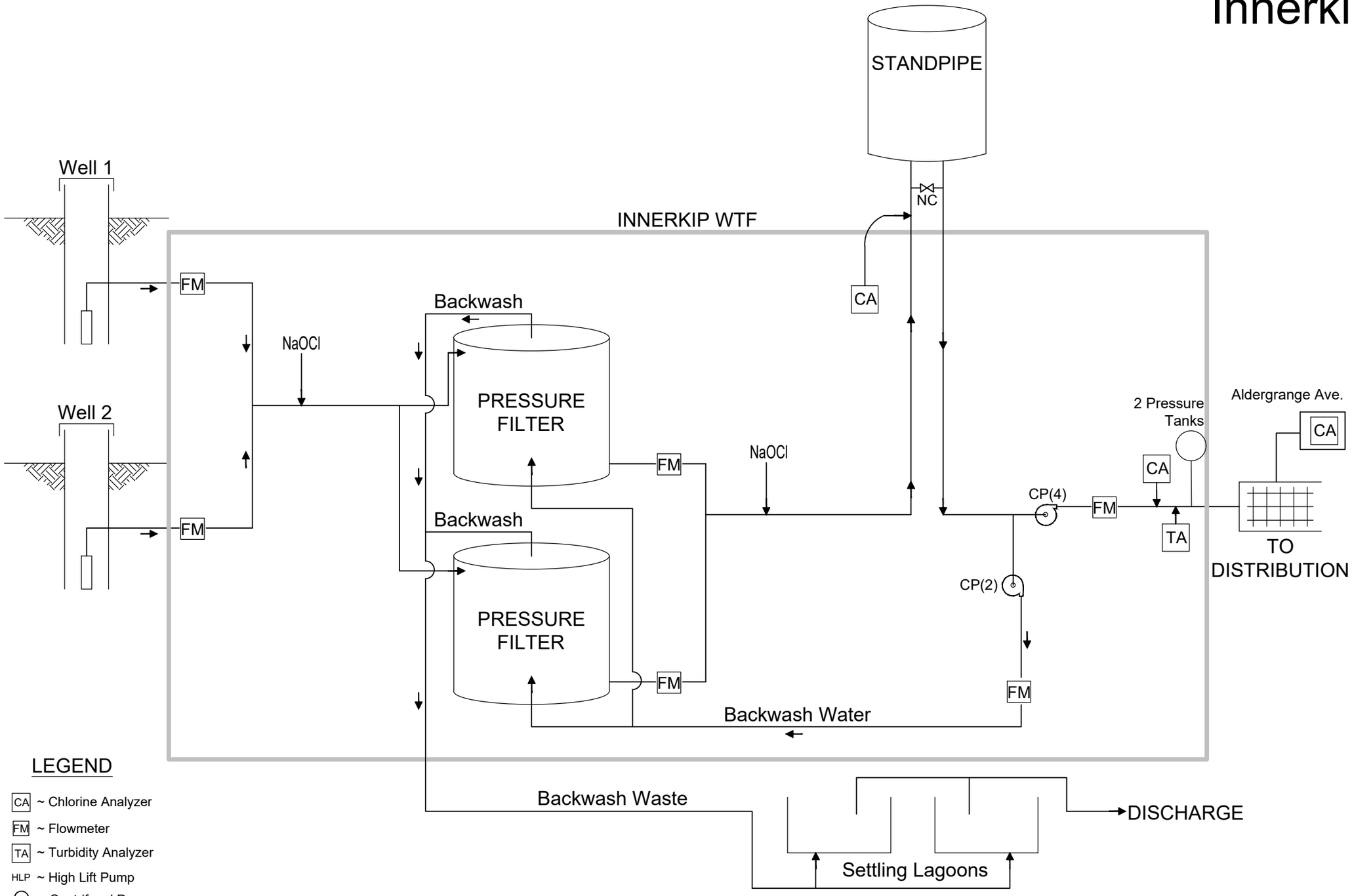
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 22, 2008
Drawing Title: INGERSOLL PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\A09 DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
7	11/18/20	Added Ferric Locations	D.C.A.
6	08/22/19	Reservoir and West Street Well 7 Offline	D.C.A.
5	10/20/16	Moved Flowmeters at Hamilton Road WTF & Merritt Street WTF	V.A.V.
4	12/01/14	Revisions to Canterbury and Thompson, correction to well #'s	C.V.
3	05/26/14	Revised and added complete backwash waste systems to all online wells	C.V.
2	09/04/12	Moved backwash waste @ Dunn Road	V.A.V.
1	12/07/11	Added Chlorine Analyzers	V.A.V.
0	09/22/08	TRANSFER TO CAD	V.A.V.

Innerkip WTF



WS

LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- HLP ~ High Lift Pump
- ~ Centrifugal Pump

REV #	DATE	REVISIONS & ADDITIONS	BY
1	04/16/09	ADDED 2 CP'S, LABELED WELLS	V.A.V.
2	10/28/11	Added CA @ distribution	BH
3	12/07/11	Moved Turbidity Analyzer, Added Flowmeter on Backwash Line	V.A.V.
4	09/04/12	Changed storage tank to standpipe	V.A.V.
5	03/24/14	Added Backwash	V.A.V.
6	21/05/14	Revised pipe crossover properties	C.V.
7	12/03/15	Added Pressure Tanks	Z.S.
8	12/07/15	Added distribution chlorine analyzer	Z.S.
9	04/12/18	Relocated chlorine analyzer & standpipe	V.A.V.
10	08/22/19	View Change and General Updates	D.C.A.

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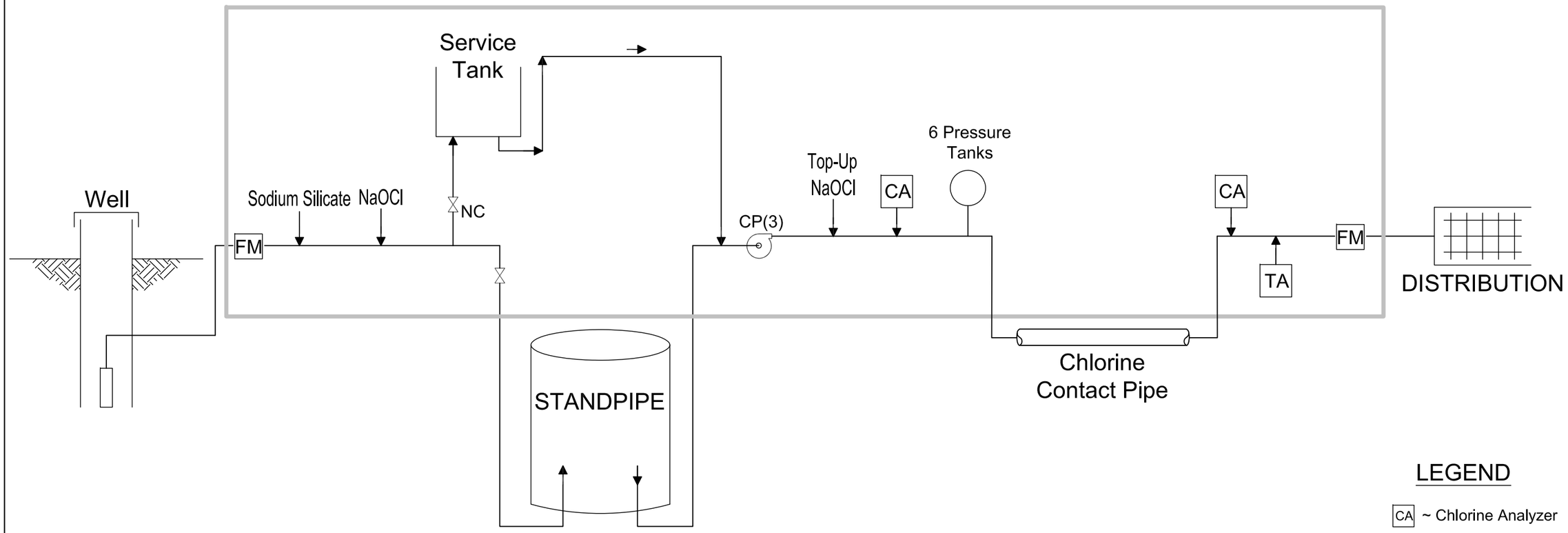
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: INNERKIP PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Lakeside WTF



LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- HLP ~ High Lift Pump
- ~ Centrifugal Pump

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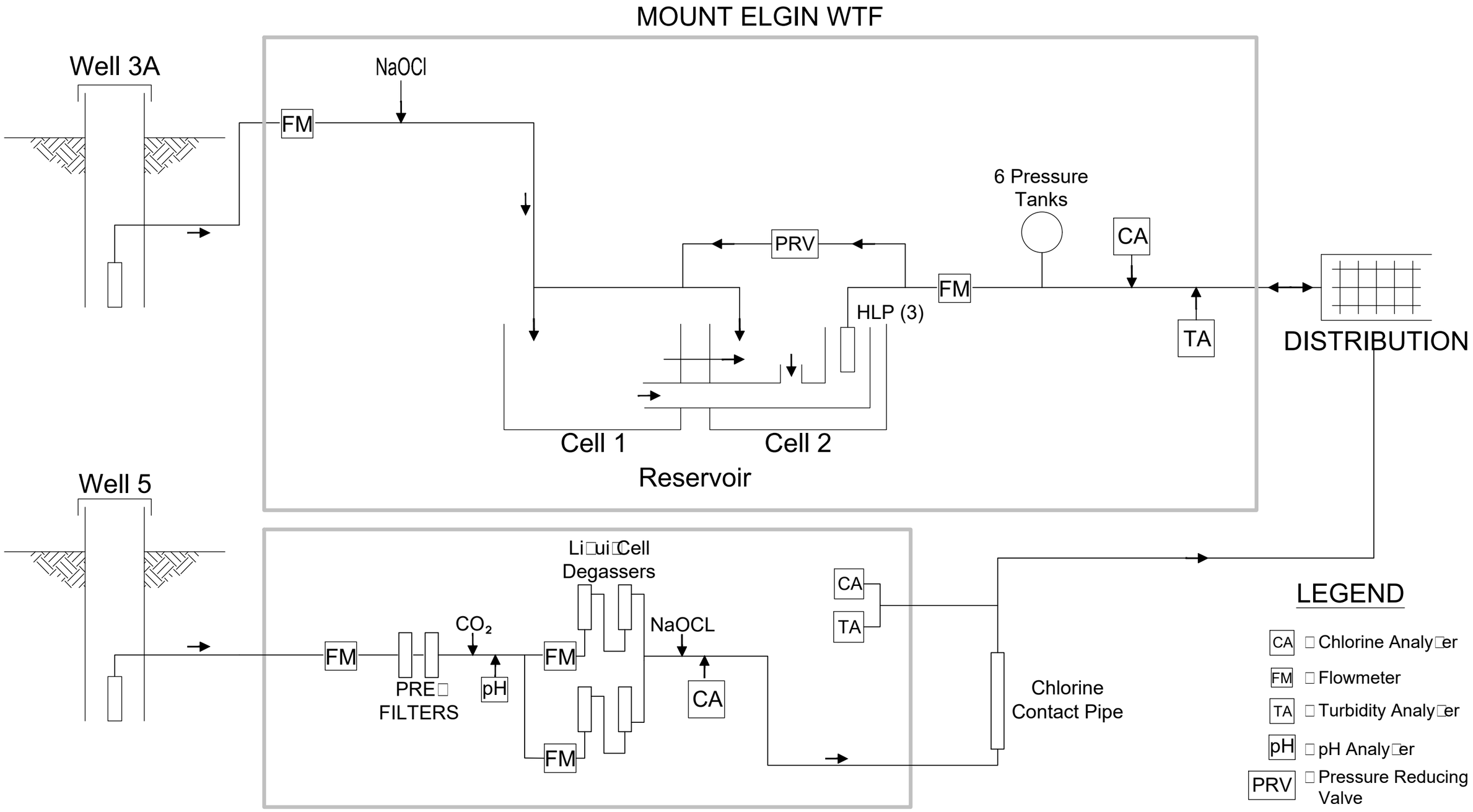
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2018
Drawing Title: LAKESIDE PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITES\DWQMS\Process Diagrams\DWQMS. dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
7	09/23/21	ADDED STANDPIPE VALVE	D.S.K.
6	11/18/20	RELOCATED SODIUM SILICATE	D.C.A.
5	04/12/18	ADDED VALVE TO SERVICE TANK, CHANGED BACK-UP TO TOP NaOCl	D.C.A.
4	03/25/14	REVISED SERVICE TANK & STORAGE TANK	C.V.
3	05/23/14	RENAMED STORAGE TANK to STANDPIPE	C.V.
2	05/04/08	POLY SILICATE TO SODIUM SILICATE	V.A.V
1	09/04/12	CHANGED STORAGE TANK TO STANDPIPE	V.A.V

Mount Elgin WTF



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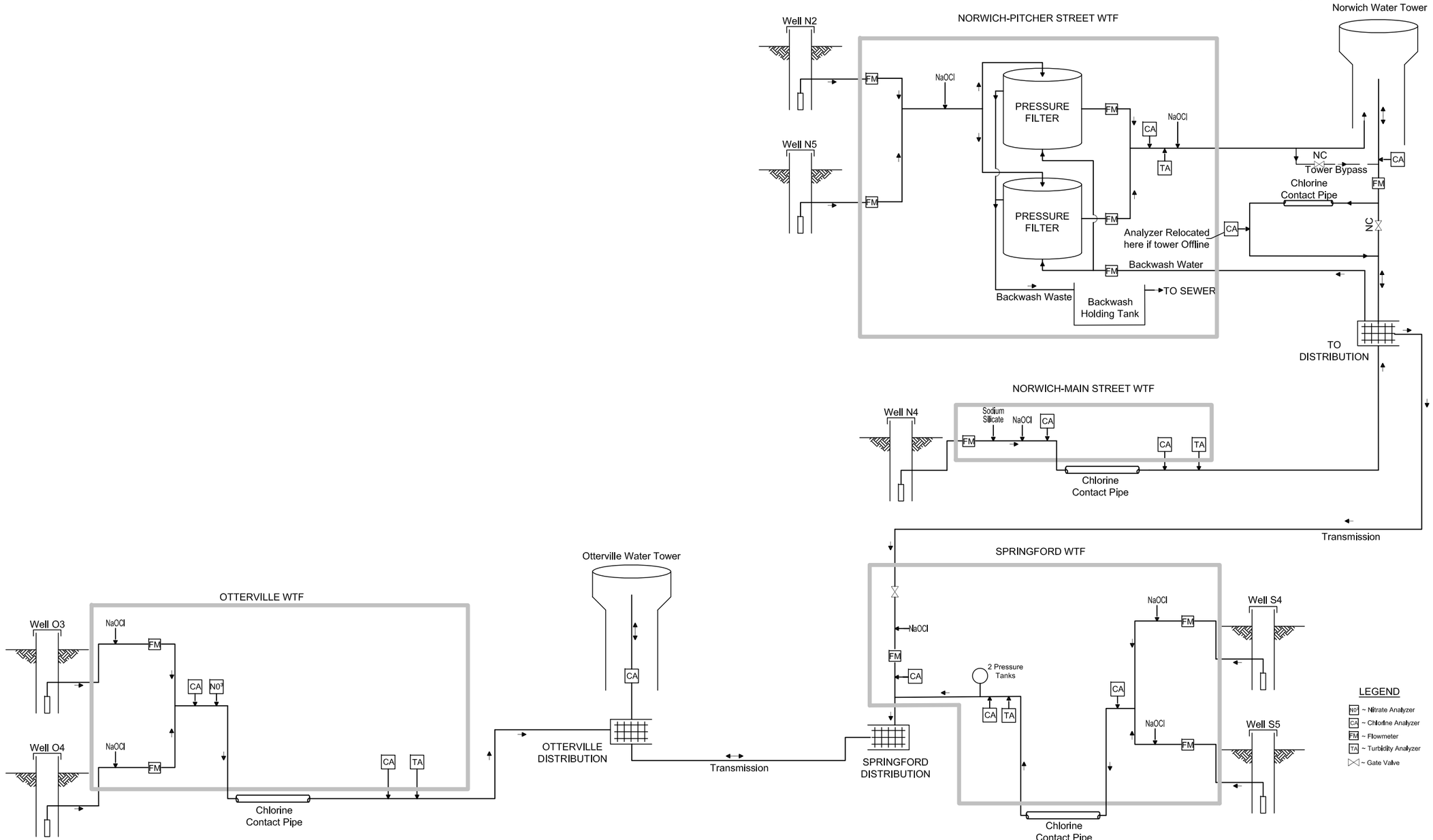
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: MOUNT ELGIN PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
0	09/15/08	TRANSFER TO CAD	V.A.V.
1	04/16/09	REMOVED WELL , ADDED FUTURE SUPPLY	V.A.V.
2	03/25/14	REVISED RESERVOIR, ADDED WELL 5 (FUTURE)	V.A.V.
3	05/03/23	UPDATED	A.J.L.

Oxford South



REV #	DATE	REVISIONS & ADDITIONS	BY
8	09/23/21	Added Valves at Norwich Tower	D.S.K.
7	11/18/20	Tower By-Pass, Chlorine Contact, Analyzer placements	D.C.A.
6	08/23/19	General Upgrades and Revisions	D.C.A.
5	04/12/18	Revised to show only one line to Springford distribution grid	V.A.V.
4	05/22/14	Added Gate Valve Rotor, FM, CA, & NaOCl to Springford WTF	C.V.
3	05/22/14	Reconfigured Greensand Filter and Backwash scematics	C.V.
2	05/22/14	Revised Facility Names	C.V.
1	05/22/14	Added building outlines, moved Chlorine contact pipes	C.V.
0	05/22/14	Combined Norwich with Springford & Otterville, created connection	C.V.

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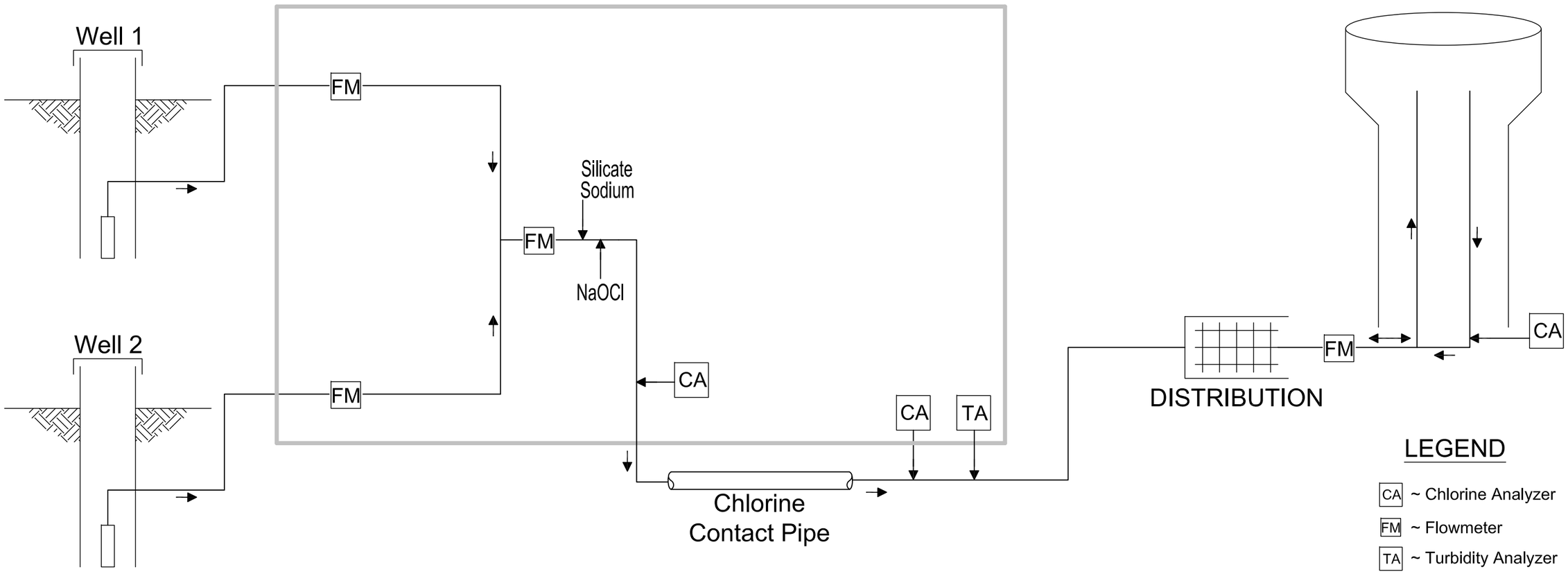
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 22, 2008
Drawing Title: OXFORD SOUTH PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Plattsville

PLATTSVILLE WTF



REV #	DATE	REVISIONS & ADDITIONS	BY
8	09/23/21	Updated Display of Flow at Tower	D.S.K.
7	10/16/19	NaOCl and Silicate Sodium injection locations switched	D.C.A.
6	08/23/19	General Upgrades and Revisions	D.C.A.
5	12/07/15	Removed NaOCl	Z.S.
1	04/16/09	LABELED WELL 2	V.A.V.
2	12/08/11	Added FM & CA; moved NaOCl	V.A.V.
3	09/04/12	Added facility name, chlorine analyzer	V.A.V.
4	03/25/14	Moved chlorine analyzer	V.A.V.

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Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: PLATTSVILLE PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Tavistock

TAVISTOCK WTF & WATER TOWER

TAVISTOCK WELL 1
PUMPHOUSE

Well 1

Well 2A

Well 3

FM

Sodium Silicate

NaOCl (2)

NC
TOWER BYPASS

CA

TA

Chlorine Contact Pipe

NC

William St.

CA

Analyzers relocated here if tower is offline

TA

CA

DISTRIBUTION

LEGEND

CA ~ Chlorine Analyzer

TA ~ Turbidity Analyzer

FM ~ Flowmeter

REV #	DATE	REVISIONS & ADDITIONS	BY
1	09/04/12	ADDED FACILTY NAMES	V.A.V.
2	03/27/14	ADDED CHLORINE CONTACT PIPE	V.A.V.
3	05/21/14	Adjusted schematic and viewport to suit	C.V.
4	05/26/14	Revised layout at chlorine contact pipe, re symbolized bypass	C.V.
5	12/07/15	Added Distribution Chlorine Analyzer	Z.S.
6	01/30/18	Added bypass for chlorine contact pipe	V.A.V.
7	08/23/19	General Revisions and updates-NC	D.C.A.
8	09/23/21	Added valve and NaOCl	D.S.K.

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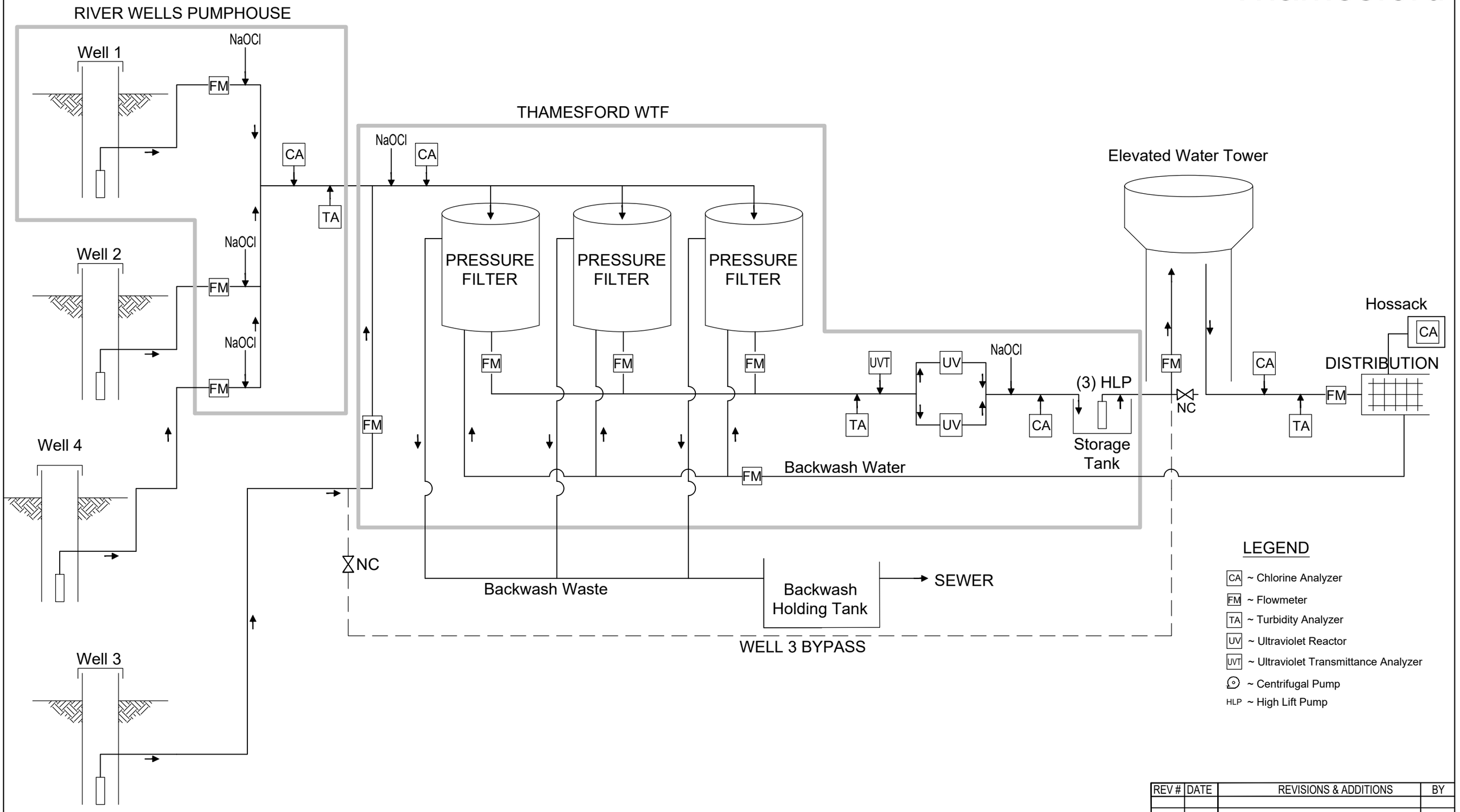
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: TAVISTOCK PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

Thamesford



LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- UV ~ Ultraviolet Reactor
- UVT ~ Ultraviolet Transmittance Analyzer
- ~ Centrifugal Pump
- HLP ~ High Lift Pump

REV #	DATE	REVISIONS & ADDITIONS	BY
11	11/18/20	Additional FM-Na0Cl location from well 4	D.C.A.
10	10/16/19	NC moved to well 3 bypass	D.C.A.
9	08/23/19	Well Bypass NC-FM Locations	D.C.A.
8	01/30/18	Revised Building Outlines, Added Future Well 4 & gate valve	V.A.V.
7	12/07/15	Added Distribution Chlorine Analyzer	Z.S.
6	05/21/14	Revised Crossover pipes and added to legend	C.V.
5	03/18/14	Added Backwash	V.A.V.
4	02/28/13	Removed bypass	

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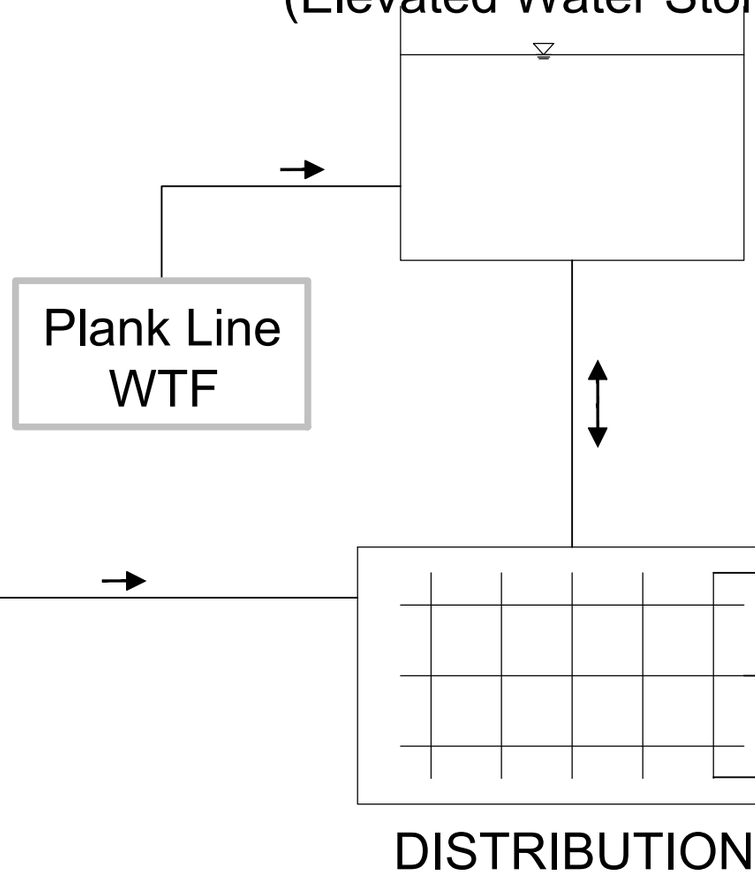
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 15, 2008
Drawing Title: THAMESFORD PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

DISTRIBUTION
Tillsonburg

Plank Line Reservoir
&
Control Building
(Elevated Water Storage)



Plank Line WTF

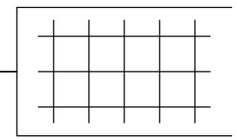
Mall Road WTF

DISTRIBUTION

North Street West Pumphouse

Broadway Street Pumphouse

Fairview WTF & Booster Station



DISTRIBUTION
(High Pressure Zone)

Rokeby Road WTF

Bell Mill Sideroad WTF

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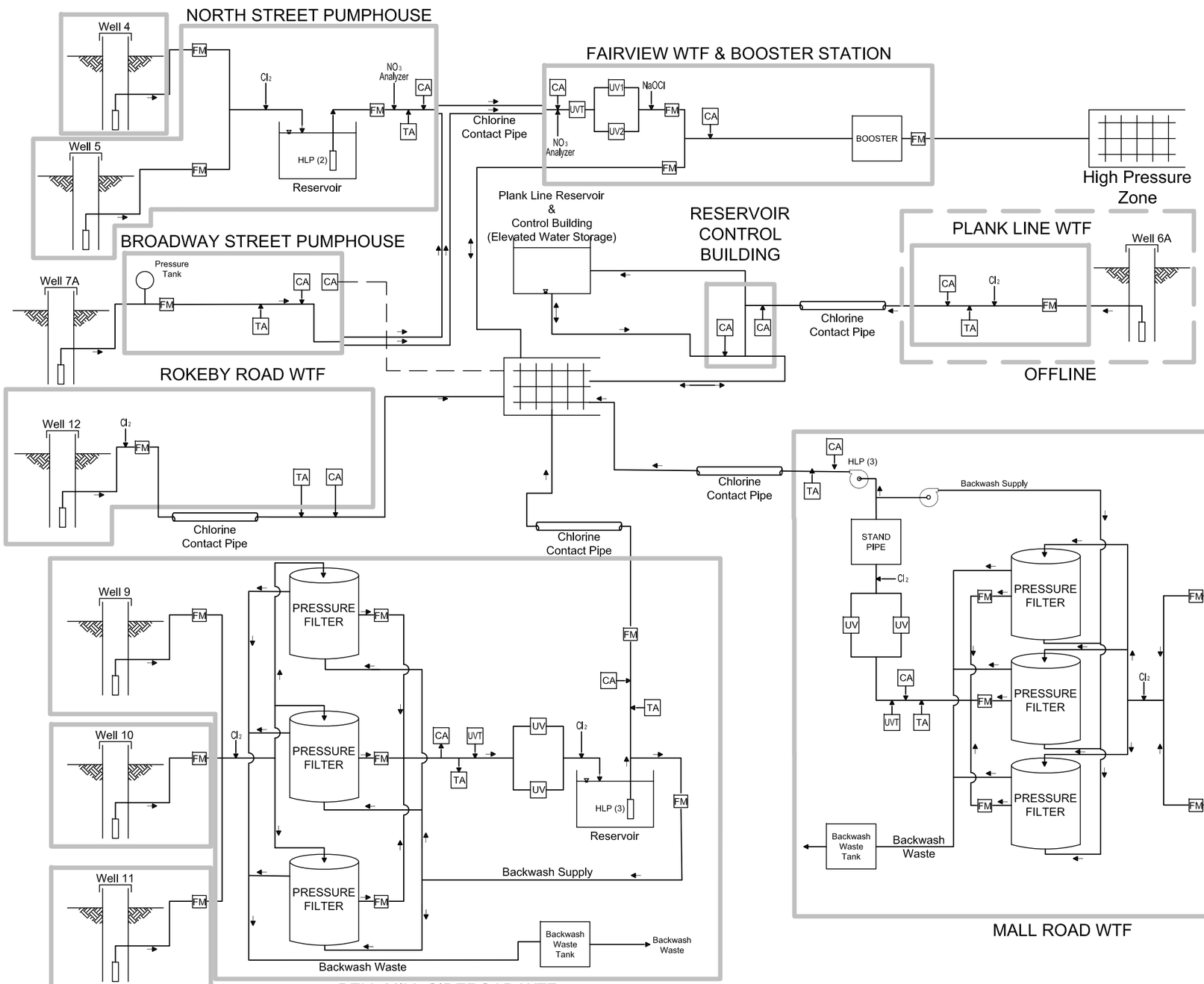
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: AUGUST 16, 2012
Drawing Title: TILLSONBURG DISTRIBUTION	File Location: X:\PUBLIC WORKS\FACILITIES\A09 DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
0	08/16/12	TRANSFER TO CAD	V.A.V.
1	03/18/14	Removed Standpipe	V.A.V.
2	04/12/18	Added North St WTF & Broadway WTF	V.A.V.
3	05/15/20	Facility Name Changes	D.C.A.

Tillsonburg

LEGEND

- CA ~ Chlorine Analyzer
- FM ~ Flowmeter
- TA ~ Turbidity Analyzer
- UV ~ Ultraviolet Reactor
- UVT ~ Ultraviolet Transmittance Analyzer
- HLP ~ High Lift Pump
- ~ Centrifugal Pump



REV #	DATE	REVISIONS & ADDITIONS	BY
12	09/23/21	Added Pressure Tank at Broadway Pumphouse	D.S.K.
11	11/18/20	HLP (3) Mall Road WTF	D.C.A.
10	06/15/20	Facility Name Changes	D.C.A.
9	08/23/19	Plank Line Pump house offline-Chlorine Contact Pipe extension	D.C.A.
8	05/29/18	Showing Broadway WTF connect to system W/ Chlorine Contact Pipe	D.C.A.
7	01/29/18	Revised building outlines, Added 2 Chlorine Analyzers at Broadway WTF	V.A.V.
6	11/14/16	Added building outline for Reservoir Control Building	C.V.
5	05/26/14	Revised location of Chlorine Contact Pipes (Rokeby & Broadway)	C.V.
4	05/26/14	Mall Rd WTF revisions to Green Sand Filter system	C.V.
3	05/26/14	Bell Mill Sideroad WTF revisions to Green Sand Filter system	C.V.
2	05/21/14	Replaced NaOCl with Sodium Silicate in Broadway Street WTF	C.V.

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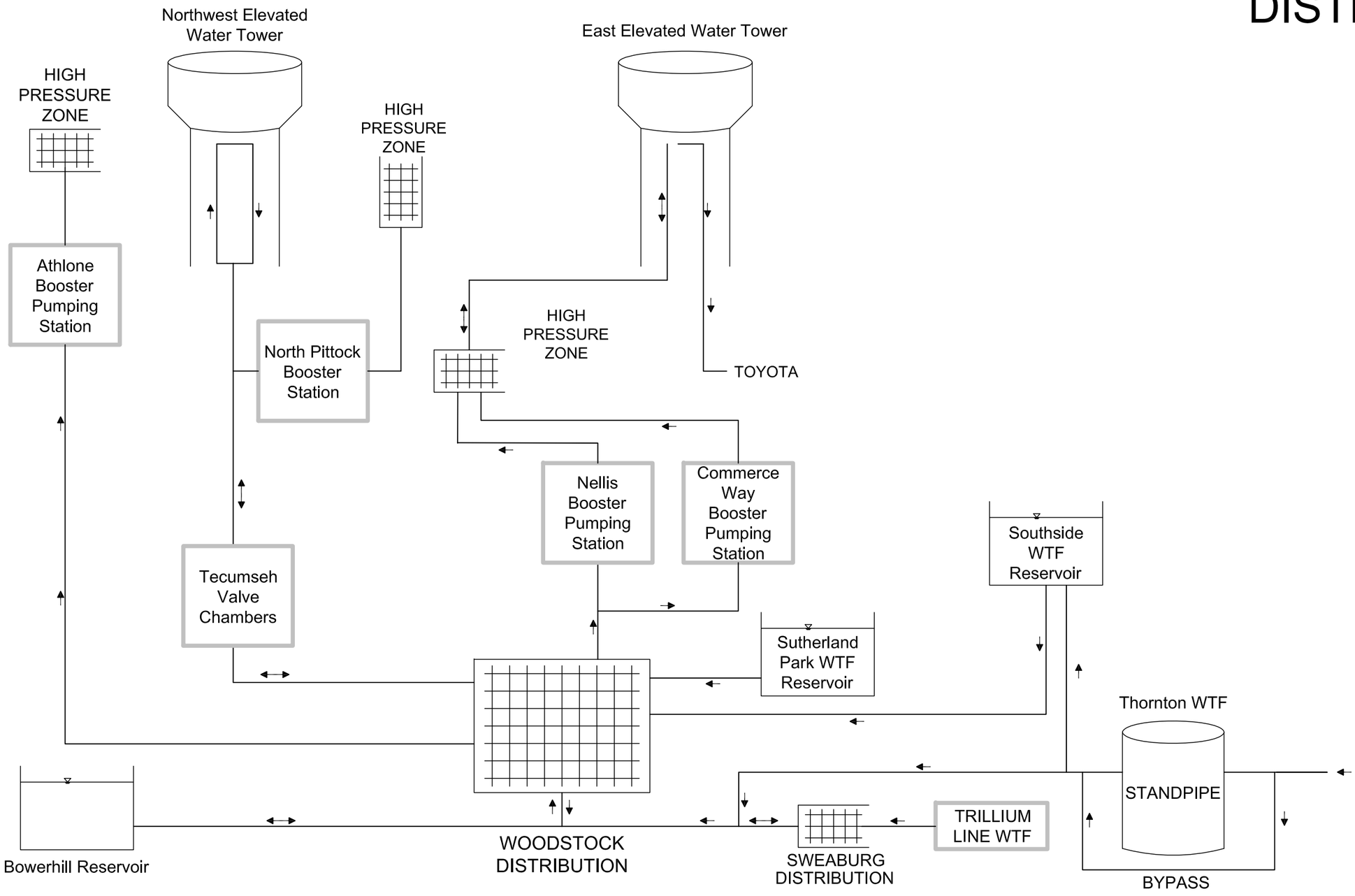
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 22, 2008
Drawing Title: TILLSONBURG PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

DISTRIBUTION
Woodstock



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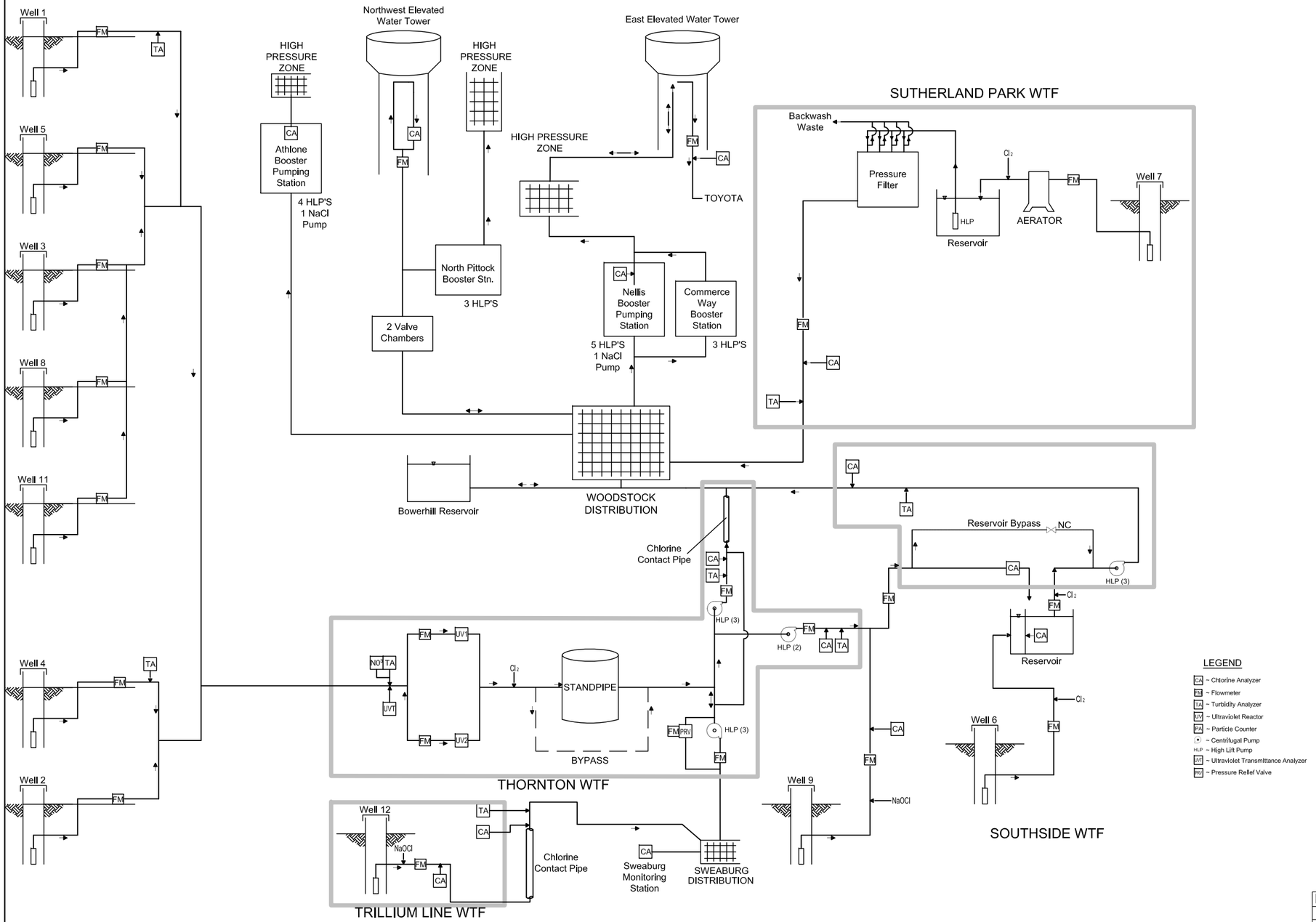
Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: AUGUST 16, 2012
Drawing Title: WOODSTOCK DISTRIBUTION PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau

REV #	DATE	REVISIONS & ADDITIONS	BY
7	09/23/21	Revised display of flow at East Tower	D.S.K.
6	11/18/20	North Pittock High Pressure Zone location	D.C.A.
5	08/10/20	High Pressure Zone Relocation	D.C.A.
4	08/22/19	Added County Road 17 Booster Stn & High Pressure zone	D.C.A.
3	04/12/18	Added arow from Sweaburg Distribution	V.A.V.
2	12/08/15	Added Techmseh valve chambers	Z.S.
1	03/18/14	Added Commerce Way Booster Station	V.A.V.

Woodstock



REV #	DATE	REVISIONS & ADDITIONS	BY
10	09/23/21	Added Treatment at Athlone, North Pittock, Nellis, and Commerce	D.S.K.
9	11/18/20	North Pittock Booster High Pressure Zone	D.C.A.
8	08/23/19	High Pressure Zone Reallocation	D.C.A.
7	08/23/19	County Road 17 Booster Stn., General Updates and Revisions	D.C.A.
6	14/10/16	Removed FM at East Water Tower; Moved FM and CL2 at Southside	V.A.V.
5	11/10/16	Removed UV at VON Hospice	V.A.V.
4	12/07/15	Added 2 Valve Chambers	C.V.
3	05/21/14	Added Commerce Way Booster Station	C.V.
2	05/21/14	Add well 12 & Chlorine Contact Pipe assembly	C.V.
1	05/21/14	Added Chlorine Analyzers	C.V.
0	12/01/14	Add Chlorine contact pipe, CA's & revise Sutherland Pressure Filter	Z.S.

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Project: DRINKING WATER QUALITY MANAGEMENT SYSTEM (DWQMS)	Date: Sept. 22, 2008
Drawing Title: WOODSTOCK PROCESS DIAGRAM	File Location: X:\PUBLIC WORKS\FACILITIES\DWQMS Process Diagrams\DWQMS.dwg
Scale: N.T.S.	Drawn By: Deborah Goudreau