

**2005 ANNUAL COMPLIANCE REPORT
OPERATION AND MAINTENANCE
CHESLEY WATER WORKS**

**MUNICIPALITY OF
ARRAN-ELDERSLIE**

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**2005 ANNUAL COMPLIANCE REPORT
OPERATION AND MAINTENANCE
CHESLEY WATER WORKS
MUNICIPALITY OF ARRAN-ELDERSLIE**

1.0 INTRODUCTION AND BACKGROUND

The purpose of the 2005 Annual Compliance Report is to document the operation and maintenance data for the Chesley Water Works for review by the Ministry of the Environment in accordance with O. Reg. 253/05.

Currently, there are 850 homes, seven (7) industries, 75 commercial and 18 institutional facilities connected to the existing water system, servicing a population of approximately 1,850 residents.

The plant was operated by Mr. Scott McLeod, who has a Class II Water Distribution licence, Mr. Mark O'Leary who has a Class I Water Distribution Licence under the supervision of Mr. Kyle Snell, Operations Manager, who has a Class IV licence for Water Treatment and Class III Water Distribution licence, Oweson Water Services (*a Division of Oweson Ltd.*). It should be noted that the Chesley water system was classified as a Class 2 Water Distribution System. The new Arran Elderslie WTP will be classified as Water Treatment 1. The Arran Elderslie distribution system (Chesley distribution system, Chesley to Paisley trunk watermain and the Paisley distribution system) is classified as a Water Distribution 3.

The operating authority for the plant is:

Municipality of Arran-Elderslie
P.O. Box 170, 1925 County Road #10
Chesley, Ontario
N0G 1L0
Telephone: 519-363-3039
Fax: 519-363-2203

Supervision by: Oweson Water Services (OWS), (*a Division of Oweson Ltd.*)

A new water treatment plant is being built that will consist of three (3) groundwater supply wells. This plant is not online to date.

As of December 27, 2005, the Chesley Pumping Stations (Community Park and Victoria Park) have provided water to Paisley and continues to do so to date.

2.0 DESCRIPTION OF WATER SYSTEM

The Chesley Water Works comprises two (2) groundwater supply wells, a water distribution system serving approximately 1,850 people in the former Town of Chesley and a water standpipe. The available treatment is chlorination, without chlorine contact storage.

Refer to the Chesley Water Works Water Treatment and Flow Schematic in **Figures 1 and 2** overleaf.

Groundwater Supply System

Victoria Park Well

- 200 mm dia., approximately 38.7 m deep drilled groundwater well, known as Victoria Park Well (Well No. 1/1937), located in Lot 31 Concession 1 (UTM Zone 17, 492644E, 4504098N) inside the pump house building and equipped with a vertical turbine pump having a rated capacity of 908 L/min and 150 mm discharge pipe. The pump is equipped with a 25 HP, 230 volt, 3 phase, 60 Hz motor.
- A well pumphouse located at the same location and housing the well, piping and treatment, including:
 - 150 mm dia. discharge piping complete with valves, fittings and a raw water sampling point.
 - A sodium hypochlorite disinfection system consisting of a 130 L capacity sodium hypochlorite solution tank and one (1) chemical metering pump with a feed line system injecting into the pump discharge piping at a location where the pipe exits the pumphouse building.
 - Bypass piping complete with a pressure relief valve to prevent over-pressurization of the distribution system.
 - Associated electrical panels, starters and controls.
 - A concrete chamber located just outside the pumphouse building which houses a turbine type flow meter with flow display located inside the pumphouse building.

Community Park Well

- 340 mm dia., 20 m deep drilled groundwater well known as the Community Park Well (Well No. 2/1948), located in Lot 32, Concession 2, (UTM Zone 17, 4906102; 4904691N) inside the pump house building and equipped with a vertical turbine pump having a rated capacity of 1816 L/min capacity, with a 150 mm dia. discharge pipe. The pump motor is equipped with a 40 HP, 220 Volt, 3 Phase, 60 Hz motor:

- A well pump house located at the same location and housing the well piping and treatment, including:
 - 150 mm dia. discharge piping complete with valves, fittings and a raw water sampling point.

 - 130 L capacity sodium hypochlorite solution storage tank and one (1) chemical metering pump with a feed line system injecting into the pump discharge piping at a location where the pipe exits the building.

 - Bypass piping complete with a pressure relief valve to prevent over-pressurization of the distribution system.

 - A standby gasoline-driven engine without an automatic transfer switch to provide standby power to the pump.

 - A concrete chamber located just outside the pump house building, which houses a turbine type flow meter.

Water Standpipe

- A 2,725 m³ capacity concrete water storage tank constructed at the north end of the Town of Chesley on Northview Crescent, having an operating capacity of 1,360 m³ between the minimum and maximum operating water elevations, designed for peak hour water demand equalization, fire and emergency storage.

- UTM coordinates: 492389E 4906102N

Trunk Watermain

During 2005 a 16km 300 mm dia. trunk watermain was installed from Chesley to Paisley. The watermain terminates at the Paisley standpipe. There are no service connections on the trunk watermain. There is a valve/meter chamber located between Chesley and Paisley. The valve chamber controls the pressure and flow from Chesley to Paisley. As of December 27, 2005, the trunk watermain was commissioned and potable water is now supplied from Chesley to Paisley.

New Treatment Plant in Chesley (not yet online)

A new water treatment plant in Chesley was under construction during the year 2005. The estimated Substantial Completion date is May 2006. The capacity for this plant is 6,219 m³/day and will treat water from the existing well (CPW 1) and two (2) new wells (CPW2 & CPW3). Both new wells will be non-GUDI wells. The new plant will treat the wells for iron and manganese removal and disinfect for chlorination only with chlorine contact time.

3.0 SUMMARY OF WATER QUALITY MONITORING

3.1 Water Treatment Equipment Operation Monitoring as Per Schedule 7, O.Reg. 253/05

3.1.1 Chlorine Residual POE

In 2005 (from January 1, 2005 to December 31, 2005), a total of 729 samples were collected and analyzed for Free Chlorine Residual at the Point of Entry (POE) for treated water. **Table 1** shows the monthly range of free chlorine residual values. It can be seen that no free chlorine residual from the Community Park Well or Victoria Park Well was less than 0.2 mg/L.

The chlorine was also monitored using an online analyzer. There were three (3) adverse results indicated by the online analyzer. **Table 7** shows the AWQI for online analyzer adverse results.

3.1.2 Chlorine Residual Distribution

In 2005 (from January 1, 2005 to December 31, 2005), a total of 365 samples were collected in the distribution system. **Table 1** shows that all free chlorine distribution samples were greater than or equal to 0.2 mg/L.

3.1.3 Turbidity

The treated water turbidity was measured by both an on-line turbidity analyzer and a portable turbidity analyzer.

3.1.3.1 Portable Turbidity Analyzer

Each time a bacteriological sample was collected from either the raw water or the distribution system, a grab sample was also collected and analyzed for turbidity. It can be seen from **Table 2** that no treated water samples, or distribution sample exceeded 1 NTU.

3.1.3.2 Online Turbidity Analyzer

The online turbidity analyzer generated three (3) adverse results. Three (3) AWQI's were generated by the analyzer. **Table 7** shows AWQI for the online turbidity analyzer adverse results.

3.2 Microbiological Sampling as Per Schedule 10, O.Reg. 253/05

3.2.1 Distribution System

Schedule 10 of Ontario Regulation 253/05 requires that at least nine (9) distribution samples be collected monthly and tested for E.Coli, Total Coliform and either Heterotrophic Plate Count (HPC) or Background Count. In 2005, a total of 116 distribution samples were collected and analyzed for Total Coliform, E.Coli and Background Count. No exceedances on these parameters were observed in the results. Refer to **Table 3** for a summary of bacteriological sampling and analysis results, and **Appendix B** for a weekly breakdown.

3.2.2 Raw Water Samples

Schedule 10 of Ontario Regulation 253/05 requires that at least one (1) raw water sample be collected weekly from both the Community Park Well and Victoria Park Well, and tested for E.Coli and Total Coliforms. In 2005, a total of 53 samples were collected and analyzed from each well.

3.2.3 Point of Entry Samples

Schedule 10 of Ontario Regulation 253/05 requires that at least one (1) treated water sample be collected weekly from the Point of Entry at the Community Park Well and at the Victoria Park Well. A total of 52 treated water samples were collected from Community Park Well and 52 samples were collected from the Victoria Park Well. All samples were analyzed for Total Coliform, E.Coli and Background Count. All analysis results were found to be safe. Refer to **Table 3**. All bacteriological samples were analyzed by SGS Lakefield Research which is an accredited lab.

3.3 Chemical Sampling & Testing as Per Schedule 13, O.Reg. 253/05

3.3.1 Inorganics

Schedule 13-2 of Ontario Regulation 253/05 requires that at least one (1) water sample is taken every 36 months, if the system obtains water from a groundwater supply that has been deemed non - GUDI. The samples for both the Community Park Well and Victoria Park Well were collected in 2003 and submitted to the laboratory for analysis of inorganics as listed in Schedule 23. All parameters were found to be within compliance. Refer to **Appendix C**.

3.3.2 Lead

Schedule 13-3 of Ontario Regulation 253/05 requires that at least one (1) distribution sample be taken every 12 months from the distribution system and tested for lead. A water sample was collected and analyzed on December 12, 2005. The concentration of lead was found to be 0.0004 mg/L, which is in compliance with the MAC of 0.01 mg/L. Refer to **Appendix C**.

3.3.3 Organics

Schedule 13-4 of Ontario Regulation 253/05 requires that at least one (1) water sample is taken every 36 months if the system obtains water from a groundwater supply that has been deemed non-GUDI. The samples for both Community Park Well and Victoria Park Well were collected in 2003 and submitted to the laboratory for analysis for all organics as listed in Schedule 24. All parameters were found to be within compliance. Refer to **Appendix C**.

3.3.4 Trihalomethanes

Schedule 13-6 of Ontario Regulation 253/05 requires that at least one (1) distribution sample is taken every three (3) months from a point in the distribution system and tested for Trihalomethanes (THMs). In 2005, samples were collected during the months of February, May, August, September and December. The Ontario Drinking Water Quality Standard (ODWQS) have set a Maximum Allowable Concentration (MAC) of 100 µg/L for this parameter and it is expressed as a running annual average. In the year 2005, the average THM was found to be 26.8 µg/L which is within compliance. Please refer to the **Table 4** on the Summary of Trihalomethanes and **Appendix C** for analytical results.

Table 4
Summary of Trihalomethanes (THMs)
January 1, 2005 – December 31, 2005
Chesley Water Works

Sample Location	Sample Date	Result (µg/L)
Standpipe North End Pipe Station	February 28, 2005	19.2
North End Pump	May 16, 2005	19.3
North End Pump	August 22, 2005	30.6
Standpipe	September 19, 2005	31.4

Sample Location	Sample Date	Result ($\mu\text{g/L}$)
Elderslie School	December 12, 2005	33.7
Annual Average		26.8

3.3.5 Nitrate & Nitrite

Schedule 13-7 of Ontario Regulation 253/05 requires that at least one (1) water sample is taken every three (3) months and tested for nitrate and nitrite from both the Community Park Well and Victoria Park Well. Samples were collected during the months of March, May, August and December. The analytical results were found to be within compliance. Refer to **Appendix C**. In 2006, samples should be collected in March, May, August and December.

3.3.6 Sodium

Schedule 13-8 of Ontario Regulation 253/05 requires that at least one (1) water sample is collected every 60 months and tested for sodium. The Ontario Drinking Water Quality Standards (ODWQS) have set a Maximum Acceptable Concentration (MAC) of 200 mg/L for sodium and requires the Medical Officer of Health be notified if the concentration exceeds 20 mg/L. These samples were collected December 18, 2003 for both the Community Park Well and Victoria Park Well and were found to be below 20 mg/L at both locations. Refer to **Appendix C**.

3.3.7 Fluoride

Schedule 13-9 of Ontario Regulation 253/05 requires that a water sample be collected at least once in every 60 months and tested for fluoride. The Ontario Drinking Water Quality Standards (ODWQS) have set a MAC of 1.5 mg/L. On November 5, 2002, a sample was collected from both the Community Park Well and Victoria Park Well for this analysis. The Community Park Well and Victoria Park Well samples were found to have a concentration of 0.30 mg/L and 1.00 mg/L respectively, which is within compliance. Refer to **Appendix C**.

All analyses were performed by Caduceon Environmental Laboratories, which is an accredited lab.

3.3.8 New Water Treatment Plant (not yet online)

Chemical sampling and testing as per Schedule 13, O.Reg. 253/05 must be performed on the new wells when the new treatment plant comes online.

4.0 WATER USAGE

The treated water quantity supplied to the distribution system in 2005 is provided in **Table 5**. A breakdown of the monthly flow provided to the distribution system can be found in **Appendix A**. A copy of the Annual Record of Water Taking is provided in **Appendix G**.

Table 5
Treated Water Quantity
Municipality of Arran-Elderslie
Chesley Water Works
January 1, 2005 to December 31, 2005

Items	Community Park Well	Victoria Park Well	Total
Annual Treated Water Supplied to the Distribution System (m ³)	249,586	36,742	286,328
Average Day Treated* Water Supplied (m ³ /day)	738	101	784
Maximum Day Treated** Water Supplied (m ³ /day)	1,593	726	2,256

Legend

- * Average day treated water supplied for Community Park Well and Victoria Park Well was calculated using annual treated flow divided by the total number of days that the pump ran, e.g., Community Park Well - 249,586 m³/338 days = 738.42 m³/day. Total average day treated water supplied is equal to the sum of each well 286,328.72 m³ divided by 365 days equalling 784.46 m³/day.
- ** Maximum day treated water supplied occurred for Community Park Well on July 15, 2005, Victoria Park Well on December 1, 2005.

From January 1, 2005 to December 31, 2005, 286,329 m³ of water was treated and provided to the Chesley distribution system. Of that total, 249,586 m³ came from the Community Park Well (lead pump) and 36,742 m³ came from Victoria Park Well (lag pump). The Chesley water system required an average of 784 m³ with a maximum day demand of 2,256 m³/day. The maximum day occurred on December 2, 2005. The Community Park Well experienced an average day demand of 738 m³ of water for the 338 days the Community Park Well provided water to the Chesley water system and a maximum day demand of 1,593 m³. The maximum day demand occurred on July 15, 2005. The Victoria Park Well experienced an average day demand of 101 m³ of water for the 363 days that Victoria Park Well contributed water to the Chesley Water System and a maximum day demand of 726 m³ of water. The maximum day demand occurred on December 1, 2005.

From January 1, 2005 to December 31, 2005 at Community Park Pumphouse, 3,978 L of sodium hypochlorite (NaOCl) was required to treat the flow of water that was provided to the distribution system with an average dosage of 2.02 mg/L. Victoria Park Pumphouse required 396 L of NaOCl with an average dosage of 1.36 mg/L for the volume that it contributed to the distribution system. The Chesley water works as a whole, required 4,374 L of NaOCl with an average dosage of 1.94 mg/L. Both the volume and the dosage are reasonable considering the volume of water treated. Refer to **Table 6**.

4.1 Water Provided to Other Areas

As of December 27, 2005, the Chesley water treatment plant began to provide potable water for the Paisley water distribution system as well as for Chesley.

4.2 New Water Treatment Plant (not yet online)

A new water treatment plant is under construction in Chesley and is expected to be completed in May, 2006. This plant will use the existing well (CPW1), as well as two new wells (CPW2 & CPW3).

5.0 COMPLIANCE WITH TERMS AND CONDITIONS OF THE CERTIFICATE OF APPROVAL AND O. REG. 253/05

5.1 Compliance with Terms and Conditions of the Certificate of Approval

Section 4.1

The rated capacity for the maximum flow rates as set out in this section were not exceeded for any of the treatment systems.

Section 5.1 i)

Flow rates and daily volumes of water conveyed into treatment systems were continuously monitored using flow-measuring devices.

Section 5.2

Daily records were maintained recording the volume of water conveyed into each treatment system.

Section 5.3

All flow measuring devices were checked and calibrated in 2005. The flow measuring devices at the Community Park Well and Victoria Park Well Pumping Stations were calibrated on September 13, 2005 and were found to be accurate within the 5 % requirement. Refer to **Appendix I** for the calibration report.

Section 6.1 and 6.2

Sodium hypochlorite used in the operation of each treatment system meets all applicable standards set by both the American Water Works Association (AWWA) and the American National Standards Institute (ANSI) safety criteria standards NSF 60. Sodium hypochlorite product registration documentation from an accredited is available at all times. Properly labelled workplace labels that meet WHIMS standards are not affixed to the chemical dosing container at each treatment system.

Section 6.4, 6.5, 6.7 and 6.8

An up-to-date Operations Manual exists for the Chesley Water System. The Operations Manual includes all requirements as set out in Section 6.5, Section 6.7 and 6.8.

Section 6.10 i), ii) and iii)

A well inspection and maintenance plan was developed and implemented in May, 2005 and includes all requirements as set out in 6.10 i), ii) and iii).

5.2 Non-Compliance Events

Table 7 documents all non-compliance events for the Chesley Water System from January 1, 2005 to December 31, 2005.

5.3 Regulation 170/03, Section II - Annual Reports

Part III - Form 2 was submitted electronically (see **Appendix H**).

Section 11 (6) (a)

Refer to Section 2.0 of this report.

Section 11 (6) (b)

Refer to Section 5.2 of this report.

Section 11 (6) (c)

Refer to the test results summarized in the text and Appendices of this report.

Section 11 (6) (d)

Refer to Section 5.2 of this report.

Section 11 (6) (e)

Refer to Section 6 of this report.

Section 11 (6) (f)

This report was prepared as per Schedule 22 of Regulation 170/03 and a copy of this report can be viewed at either the offices of Municipality of Arran-Elderslie, 1925 County Road #10, Chesley, Ontario, NOG 1L0 or Oweson Water Services, (a Division of Oweson Ltd.), Owen Sound Professional Centre, 945 Third Avenue East, Suite 230, Owen Sound, N4K 2K8.

Section 11 (9.1)

Once the report has been presented to the Owner (Municipality of Arran-Elderslie), the Owner will take all reasonable steps to notify all users of the system that the report is complete and where it may be viewed. Refer also to Form III - Part 2 in **Appendix H**.

Section 8.1 and 8.2

Appropriate primary disinfection for the groundwater raw water supply for the Victoria Park Well and Community Park Well will be provided by March 31, 2006.

Section 8.3 i) ii) iii)

Upgrade requirements as per this section will be provided by March 31, 2006.

Section 8.5 i)

In the interim period up to March 31, 2006, appropriate measures by the Municipality of Arran-Elderslie will be applied to maintain at all times a minimum free chlorine residual of 0.2 mg/L throughout the distribution system.

6.0 IMPROVEMENTS TO SYSTEM AND ROUTINE AND PREVENTATIVE MAINTENANCE

The following summarizes water system improvements and routine and preventative maintenance to the Chesley water distribution system in 2005:

Watermain and Service Breaks Repaired in 2005

There were four (4) watermain breaks and two (2) service leaks in 2005 on the Chesley water system.

System Improvements and Routine and Preventive Maintenance 2005

The following work took place on the Chesley water distribution system in the Year 2005:

1. Rebuilt hydrants were installed at 3rd Avenue Southwest (#38) and 1st Avenue South (#21). The bottom drain ring was repaired on #36 and #68. The fire hydrant #51 at 1st Avenue near the new Credit Union was relocated across the road with a new Storz fitting.
2. The watermain on 4th Street Northwest between 1st Avenue North and Hawkins Street was replaced during the trunk watermain construction with a 6" PVC pipe.
3. There was one (1) new commercial water service installed on 3rd Street Southeast at the new Credit Union building and two (2) new residential services installed at Tower Park.
4. Two (2) new 4" valves were installed in Chesley. One (1) was replaced on 4th Avenue and 3rd Street Southwest and a new installation at 2nd Avenue and 4th Street Southeast. Both are new resilient valves.
5. Systematic flushing was done on the system in Chesley, once in the spring in the month of April. The systematic fall flushing was started in late November but was not completed due to early snowfall. Periodic flushing was completed twenty seven (27) different times throughout the year due to construction, maintenance or dead end flushing.
6. The water flow meters at Victoria Park Well and Community Park Well were calibrated on September 13, 2005.
7. The perimeter of the Victoria Park Pumphouse was fenced with a chain link fence for security.
8. The Chesley Hospital installed a backflow preventer on their water service line.

7.0 MINISTRY OF THE ENVIRONMENT INSPECTIONS AND PROVINCIAL OFFICER'S ORDERS

The Ministry of the Environment inspection of the Chesley water system was performed on July 12, 2005. The Ministry of the Environment Inspection Report was received on August 31, 2005. The Provincial Officer's Inspection Report, as well as the Provincial Officer's Order No. 2123-5L4KV2, is located in **Appendix D**. Reports of Compliance submitted by Oweson Water Services (*a Division of Oweson Ltd.*) on behalf of the Municipality are also attached in **Appendix D**.

8.0 CONCLUSIONS/RECOMMENDATIONS

1. The Class Environmental Assessment for the upgrades to the water system has been completed. The Environmental Assessment Notice of Completion was advertised in August 2004.

A new water treatment plant is being built and will utilize the existing well CPW1 and two (2) new wells, CPW2 and CPW3. The new treatment plant's estimated completion date is May 2006.

Chesley has been supplying water to Paisley since December 2005 and will continue to do so in 2006.

2. The water system was generally operated in compliance with the Regulations. The water system should continue to be operated in compliance with O.Reg. 170/03 and the Certificate of Approval.
3. Bacteriological sampling was performed on the Chesley Water System as per Regulation requirements.
4. Sampling and analyses of chemical parameters were performed on the water system in compliance with the Regulations. The samples met the requirements of the ODWQS.
5. In 2005, the average day flow for the water system was 784 m³/d. The maximum day flow for the entire system was 2,256 m³/d. The maximum day flow for the Community Park Well was 1,593 m³/d and for the Victoria Park Well, it was 726 m³/d.
6. Several Adverse Water Quality Incident Reports were made for the Chesley Water System in 2005, which are summarized in **Table 7**. These included elevated turbidities and high and low chlorine residuals which were detected by the online analyzers.
7. The annual average dosage of sodium hypochlorite was 1.94 mg/L.
8. Several improvements were made to the system as well as routine and preventive maintenance, as summarized in **Section 6.0** of this report.

9. The Ministry of the Environment Inspection Report was received on August 31, 2005. The required actions of the report were compiled with and Reports of Compliance were submitted to the Ministry of the Environment on behalf of the Municipality by Oweson Water Services (*a Division of Oweson Ltd.*).

Respectfully submitted:

OWESON WATER SERVICES
(*a Division of Oweson Ltd.*)

Geoff Aitken, A.Sc.T
Compliance Manager
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Appendix A

Treated Water Flows, Turbidity and Disinfectant Residual and Monthly
Flow Provided to the Distribution System

Appendix B

Bacteriological Sampling and Analysis

Appendix C

Monthly, Quarterly and Annual Sampling and Analysis

Appendix D

MOE Inspection Report

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Certificate of Approval

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Permit to Take Water

Appendix G

Annual Record of Water Taking

Appendix H

Part III, Form 2 O. Reg 170/03 Annual Report

Appendix I

Water Meter Calibration