Region of Peel Permit to Take Water Groundwater and Surface Water Monitoring Program

2025 – Cheltenham Annual Water Level and Water Quality Report

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1 Introduction

Watermark Environmental Ltd. (WEL) was retained by the Regional Municipality of Peel (the Region of Peel) to conduct the 2025 Groundwater Level and Groundwater Quality Monitoring Program (2022-222vPC13-1-021) for the Cheltenham municipal wellfield. Two (2) municipal production wells, Cheltenham Well 1 (CHEL 1) and Cheltenham Well 2 (CHEL 2), are operated by the Region of Peel in the Cheltenham municipal wellfield.

This report is organized to provide a hydrogeological background on the Cheltenham municipal wellfield and summaries of the groundwater monitoring work completed in 2025. The summaries of the groundwater and surface water monitoring work completed include an overview of the methodologies employed; the scope of the monitoring completed; and the results of the monitoring completed. Where relevant, observations of historical monitoring years are also included to provide further context to existing and/or emerging water level and water quality trends. Finally, conclusions of the monitoring program from 2025 are summarized together with any recommendations for the following annual groundwater and surface water level monitoring program in 2026.

1.1 Cheltenham Municipal Wells

CHEL 1 and CHEL 2 are located at the Region of Peel's Cheltenham Water Treatment Plant located at 14190 Creditview Road, Cheltenham, Ontario. Both CHEL 1 and CHEL 2 are located within the Cheltenham Water Treatment Plant building. As well, both CHEL 1 and CHEL 2 are screened less than 10 m above the underlying bedrock surface within a sand and gravel aquifer. Further discussion of regional hydrostratigraphy as it relates to the current study is provided in the next section. The locations of the Cheltenham municipal wells are illustrated on **Figure 1**. The well construction details for the municipal wells are summarized in **Table 1.1**.

Table 1.1 Cheltenham Municipal Wells Construction Details
Source: WEL, 2024

Well ID	MOE Well Tag	Year of Well Construction	Well Depth (mbgs)	Screen Length (m)	Screen Interval (mbgs)	Aquifer Materials
CHEL 1	4907977	1995	51.6	6.2	44.8 – 51.0	Sand, gravel
CHEL 2	4907976	1995	51.8	6.1	45.0 – 51.3	Sand, gravel

According to the current PTTW 2505-AW9JW4, the Region of Peel is permitted to take water from the Cheltenham municipal wells according to the allotments provided in **Table 1.2**. The current PTTW will expire on February 29, 2028.

Table 1.2 Cheltenham Municipal Wells PTTW Summary
Source: Table A from PTTW 2505-AW9JW4

Well ID	Maximum Volume (L/min)	Maximum Volume (L/day)
CHEL 1	1,020	1,468,000
CHEL 2	1,020	1,468,000
Maximum Combined Taking Permitted	1,020	1,468,000

1.2 Geological and Hydrogeological Setting

1.2.1 Physiography

The Cheltenham municipal wells are located within the South Slope physiographic region; however, they are located just off of the mapped southern extent of the Niagara Escarpment physiographic region in the area. The South Slope physiographic region is characterized by shallow shale and till plains with a gentle slope south toward Lake Ontario (Chapman, 1984).

The distribution of physiographic regions in the surrounding area is presented on **Figure 2**.

1.2.2 Topography and Drainage

The Cheltenham municipal wells are located just east of the Credit River and is located at the border between the Cheltenham to Glen Williams Subwatershed and Forks of the Credit to Cheltenham Subwatershed within the Credit River Watershed. Locally, the Cheltenham municipal wells are situated at the top of the Credit River valley, where ground surface topography drops steeply toward the Credit River to the west, while a topographic plateau is found to the east. Near the municipal wells, the Credit River traverses northeast to southwest of the municipal wells while flowing in a southwesterly direction. Based on local topographic relief, the overland drainage scheme within the municipal wellfield is generally to the north and west toward the Credit River.

A topographic map of the surrounding area is presented on **Figure 3**.

1.2.3 Surficial Geology

The understanding of regional geology and hydrogeology under which the current report has been prepared is based on the related information and mapping prepared by the Oak Ridges Moraine Groundwater Program (ORMGP) and the Ontario Geological Survey (OGS). The ORMGP, through their online mapping portal, provides the most accessible and up-to-date consensus on regional hydrogeological mapping and a comprehensive compilation of pertinent hydrogeological data relevant to the study area. The following hydrostratigraphic units overlie the bedrock (from youngest to oldest) in the vicinity of the Cheltenham municipal wells:

- Halton Till
- Oak Ridges Moraine

- Newmarket Till
- Lower Sediments (including: Thorncliffe Formation, Sunnybrook Drift, and Scarborough Formation)

The Cheltenham municipal wells are screened in a buried bedrock aquifer system. The buried bedrock aquifer system is said to extend eastward to Caledon East, north to Alton, and southwest to Terra Cotta (R.J. Burnside, 2002). The buried bedrock valley is infilled by a complex assemblage of interlaid deposits of sand and gravel together with fine silt and clay, ranging from 50 m to over 70 m thick depending on the underlying bedrock elevation (R.J. Burnside, 2007). Those silt and clay deposits represent the Halton Till Aquitard hydrostratigraphic unit. The deposits of sand and gravel become thicker to the east, nearing the flanks of the bedrock valley, and it is in these deposits where the municipal wells are screened (R.J. Burnside, 2007). Interpretations of the buried bedrock aquifer system in the area of the municipal wells indicate that there are two distinct layers, including an upper sand layer (the "Upper Aquifer"), and an intermediate sand and gravel zone (the "Intermediate Aquifer") where the municipal wells are screened. A "Lower Aquifer" is found overlying the bedrock surface to the north of the municipal wells but is not encountered by the municipal wells (R.J. Burnside, 2007). Owing to the thickness of the Halton Till Aquitard overlying the municipal wells, the Cheltenham Municipal Wells are classified as not under the direct influence of surface water ("Non-GUDI"), and the aquifer supplying CHEL 1 and CHEL 2 is considered to be confined (R.J. Burnside, 2007).

A surficial geology map capturing the Cheltenham municipal wellfield is included as **Figure 4.** Hydrostratigraphic cross-sections taken through CHEL 1 and CHEL 2 in perpendicular directions from the ORMGP model (2024) are included as **Figure 5**.

1.2.4 Bedrock Geology

Bedrock mapping of Southern Ontario, prepared by the OGS (OGS, 2011), accessed through the ORMGP, indicates that shale bedrock of the Queenston Formation underlies the overburden soils in the area. The bedrock topography in the area is characterized by a period of significant weathering from glacial and fluvial processes that lead to the formation of the numerous bedrock valleys now infilled with highly conductive sand and gravel deposits.

A bedrock geology map capturing the study area of CHEL 1 and CHEL 2 is included as **Figure 6**.

2 Groundwater Level Summary

2.1 Groundwater Level Monitoring Scope

A summary of the groundwater level monitoring conducted in 2025 is provided in the summary tables of **Appendix B**. In **Table B-1** of **Appendix B**, the monitoring locations are identified along with the frequency of monitoring which was included in the 2025 monitoring year. In 2025, the Cheltenham municipal wellfield monitoring program included 8 groundwater monitoring stations capturing shallow, intermediate, and deep aquifer horizons. No surface water monitoring was included in the program for 2025. The monitoring locations are illustrated on **Figure 1**.

The groundwater level monitoring program for 2025 included the following major tasks:

- Above ground inspection of monitoring wells and drivepoints to document any maintenance requirements;
- Collection of above ground monitoring well and drivepoint construction details, including stick-up, well diameters, etc.;
- Entry of all field monitoring data into the Region of Peel Survey123 monitoring well inspection app;
- Measurement of static groundwater levels at all seasonal monitoring locations;
- Downloading and Quality Assurance/Quality Control (QA/QC) of data retrieved from FlowWorks where realtime data for non-seasonal monitoring locations is saved; and
- Compiling groundwater level monitoring data for submission to the Region of Peel.

Groundwater levels were manually measured using a water level tape. To reduce the risk of cross-contamination between monitoring wells, the probe of the water level meter was cleaned with a 1% solution of Alconox® detergent and rinsed with distilled water, prior to each use.

Continuous groundwater level monitoring data at all permanent (non-seasonal) monitoring locations was downloaded online from FlowWorks. Manual groundwater levels from all seasonal monitoring locations continued to be measured in the field and the data was managed by Watermark Environmental prior to submission to the Region of Peel.

Groundwater levels from the municipal wells were provided by the Region of Peel, including manual groundwater levels measured by Region of Peel operators and continuous operations data on CHEL 1 and CHEL 2 recorded by the Region of Peel supervisory control and data acquisition (SCADA) system. Operations data from CHEL 1 and CHEL 2 supplied by the Region of Peel included daily total flow, and maximum, minimum and average groundwater levels.

2.2 Groundwater Level Trends

Table C-1 in **Appendix C** summarizes the groundwater levels from the Cheltenham wellfield during the monitoring period together with water levels that have been collected historically. Historical groundwater levels were obtained directly from the ORMGP, as needed. Water level hydrographs are also included in **Appendix C** to illustrate the seasonal variability and overall continuity of water levels beginning from January 2025 through December 2025 within the Cheltenham wellfield. After review of the water level monitoring data from 2025, the following conclusions are offered:

- When compared with flow data from the municipal pumping wells CHEL 1 and CHEL 2, the normal short-term pumping operation of the municipal wells does not result in significant drawdowns at the monitoring wells. Overall, the influence of the pumping wells on surrounding groundwater levels is most evident in monitoring wells screened closer to, and at similar depths as the pumping wells. For example, monitoring well TW1-93 near the pumphouse is influenced by the pumping wells, and monitoring well EW2-3D, which is further away, is not. Groundwater levels are shown to rebound quickly following a measured drawdown;
- Groundwater elevations between January 2025 and December 2025, inclusive, displayed an expected range of seasonal variability. Considering the confined nature of the deep aquifer and infiltration potential of the overlying Halton Till Aquitard, there is negligible groundwater variability observed throughout the year. These groundwater level trends have also been observed historically by the Region of Peel (2022) and WEL (2024, 2025); and
- The operation of the municipal wells had no discernable influence on the shallow groundwater system measured in the shallow monitoring wells. Moreover, considering the utilization of the municipal wells, their zone of influence is found to be localized to the area of the Cheltenham Water Treatment Plant.

Considering groundwater levels collected in 2025, there is no significant difference from the groundwater level variability recorded in 2023 or 2024 within the monitoring network. This suggests that there have been no unexpected changes in the groundwater levels within the municipal wellfield and that the current operations of the Cheltenham municipal wells are sustainable at present.

Included at the end of **Appendix C** is a hydrograph illustrating static groundwater levels at CHEL 1 and CHEL 2 over the previous 5 years. As evidenced in this hydrograph, static groundwater levels fluctuate within a normal range of variability and have been stable overall during this time. Based on these monitoring results, there have been no significant changes in the groundwater resources available to CHEL 1 and CHEL 2. Barring any significant changes in pumping intensity at the municipal wells, similar trends are expected in 2026.

3 Water Quality Summary

3.1 Water Quality Sampling Methodology

The results of groundwater sampling completed in 2025 are provided in the summary tables of **Appendix D**. Within the tables of **Appendix D**, the sampling locations are identified along with a water quality parameter reference table organizing the analyses for samples collected within the Cheltenham wellfield. There is currently no surface water sampling in the Cheltenham wellfield. In all, five (5) monitoring locations were included in the groundwater quality sampling program in May 2025. It is understood that from year-to-year, water quality sampling alternates between the autumn and spring sampling events; therefore, in 2026, water quality monitoring should be completed in the fall monitoring period.

Where possible, groundwater quality samples were collected following an initial purging of at least three (3) well volumes measured at the time of sampling. In cases where a significant volume of groundwater would require purging, confirmation of sufficient well purging was determined on a case-by-case basis using field parameters for Temperature, pH and conductivity as recorded by a handheld multi-parameter probe. Groundwater quality samples were collected by either a manual inertial pump or hydrolift, using wattera tubing and footvalves, or a bailer where more appropriate. Field-filtered samples were collected for metals as well as for Organic Nitrogen, Chemical Oxygen Demand, and Total Kjeldahl Nitrogen, as needed. Field-filtered samples were passed first through a 0.45 micron field filter.

After collection, all samples were placed on ice within dedicated coolers for transport to the laboratory. All samples were submitted to Bureau Veritas Canada Inc. (BV Labs) in Mississauga, Ontario, for analysis on the same day that they were collected. The Certificates of Analysis (CoAs) and Chains of Custody (COCs). The laboratory certificates of analysis are included in **Appendix E**.

3.2 Groundwater Quality Trends

Analytical results were compared to the Aesthetic Objectives (AOs), Operational Guidelines (OGs), and Maximum Acceptable Concentrations (MACs) of the Ontario Drinking Water Standards (ODWS) Ontario Regulation 169/03. After review of the water quality results from 2025, the following conclusions are offered:

- No exceedances of any parameter with a reported ODWS MAC criteria were identified, including Nitrate. For Nitrate specifically, concentrations in 2025 were non-detect or very low, similar to 2024 and historical water quality data from CHEL 1 and CHEL 2;
- Concentrations for both Chloride and Sodium were above the ODWS AOs of 250 mg/L and 200 mg/L, respectively, at monitoring wells CHEL OW1-30S and CHEL OW1-90D; and
- VOC, BTEX, and PHC parameters were reported as non-detect at all locations where those parameters were sampled.

Historical time-concentration plots of the parameters Nitrate, Chloride, and Sodium supplemented with results of sampling from 2025 are provided in **Appendix D**. Historical water quality information was obtained directly from the ORMGP, as needed.

Based on the time-concentration plots, the concentration of Nitrate at the monitored locations have been low, if not non-detect, and stable over the previous 10 years. This is to be expected considering the confined nature of the aquifer supplying the Cheltenham municipal wells; the low potential for infiltration offered by the overlying Halton Till Aquitard; and predominantly rural and spread-out land uses within the Cheltenham municipal wellfield.

When assessing concentrations for Chloride and Sodium, concentrations in 2025 were generally consistent with historical concentrations, with neither monitoring wells CHEL OW1-30S nor CHEL OW1-90D following any discernable trends. By comparison, the historical concentrations of Chloride and Sodium reported at monitoring well CHEL EW2-3D have an established stable trend below their respective AOs. Sampling at monitoring wells CHEL EW3-2S and CHEL TW1-93 were initiated in 2025; therefore, further monitoring will be required to identify any trends at these monitors.

4 Conclusions and Recommendations

4.1 Conclusions

Using the water level and water quality monitoring data collected over the 2025 monitoring period, and considering the results historical water level and water quality monitoring, the following conclusions in regard to the operations of CHEL 1 and CHEL 2 are offered:

- Groundwater elevations between 2025 and historically continue to display a stable, flat trend. Considering the confined nature of the deep aquifer and infiltration potential of the overlying Halton Till Aquitard, there is found to be negligible groundwater variability throughout the year.
- When compared with flow data from the municipal pumping wells CHEL 1 and CHEL 2, the normal short-term pumping operation of the municipal wells does not result in significant drawdowns at the monitoring wells. The influence of the pumping wells on surrounding monitors depends on the depth, distance, and elevation of those monitors relative to the pumping wells.
- In 2025, there were no water quality parameters that exceeded the ODWS MAC at the monitoring locations that were sampled. Similar observations have been made historically for the sampled locations.

4.2 Recommendations

Based on these conclusions, the following recommendations are offered for the 2026 monitoring year:

- Continue the current groundwater level monitoring program and assess the monitoring data in context of historical monitoring results for trends that may indicate irregular influences from the pumping wells; and
- Continue the current water quality sampling program to monitor for any changes in water quality at surrounding wells, and to continue reporting on the observed trends in Chloride and Sodium.

5 Signatures

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Revision History

Rev	Date	Description	Prepared by	Approved by
--	2026-02-17	Initial Draft submission for review	Victor Marcucci	Ian Gardiner
00	2026-02-26	Report Submission	Victor Marcucci	Ian Gardiner

6 References

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Watermark Environmental Ltd. 2024. 2023 – Cheltenham Annual Water Level and Water Quality Report dated March 25, 2024.

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Figures

Appendix A

Cheltenham Municipal Wells PTTW 2505-AW9JW4

Appendix B

Monitoring Network Summary Tables

Appendix C

Groundwater Levels

Appendix D

Groundwater Quality Results

Appendix E

Groundwater Quality Certificates of Analysis