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

2025 – Alton Annual Water Level and Water Quality Report

February 2026

Prepared for:
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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 Alton municipal wellfield. Two (2) municipal production wells, Alton Well 3 (ALT 3) and Alton Well 4A (ALT 4A), are operated by the Region of Peel in the Alton municipal wellfield.

This report is organized to provide a hydrogeological background on the Alton municipal wellfield and summaries of the groundwater and surface water 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 Alton Municipal Wells

ALT 3 and ALT 4A are located at the Region of Peel's Alton Water Treatment Plant located at 1640 Queen Street East, Alton, Ontario. Whereas ALT 3 is located within the Alton Water Treatment Plant building, ALT 4A is located outside, just east of the Water Treatment Plant building. Both ALT 3 and ALT 4A are screened within an unconfined to slightly leaky sand and gravel aquifer infilling a bedrock valley. The aquifer is known locally as the Alton Meltwater Channel (GeoKamp, 2015). Further discussion of regional hydrostratigraphy as it relates to the current study is provided in the next section. The locations of the Alton municipal wells and the monitoring locations included in the monitoring program for 2025 are illustrated on **Figure 1**. The relevant well construction details for the municipal wells are summarized in **Table 1.1**.

Table 1.1 Alton 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
ALT 3	4909903	1986	26.5	7.5	17.2 – 24.7	Sand, gravel
ALT 4A	A236788	2019	17.6	3.1	13.7 – 16.8	Sand, gravel

According to the current PTTW No. P-300-9058863382, the Region of Peel is permitted to take water from the Alton Municipal Wells according to the allotments provided in **Table 1.2**. The PTTW No. P-300-9058863382 will expire on August 31, 2034.

Table 1.2 Alton Municipal Wells PTTW Summary
Source: Table A from PTTW P-300-9058863382

Well ID	Maximum Volume (L/min)	Maximum Volume (L/day)
ALT 3	727	1,047,398
ALT 4A	727	1,047,398
Maximum Combined Taking Permitted	727	1,047,398

1.2 Geological and Hydrogeological Setting

1.2.1 Physiography

The Alton municipal wells are located within the Guelph Drumlin Field physiographic region. This physiographic region is characterized by low-lying till drumlins (Chapman, 1984). Between the Town of Alton and the Town of Caledon Village, the Guelph Drumlin Field physiographic region is situated between the Hillsburgh Sandhills and the Niagara Escarpment physiographic regions, which are located to the north and south, respectively.

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

1.2.2 Topography and Drainage

The Alton municipal wells are located towards the mid-eastern boundary of the Shaw's Creek Subwatershed within the Credit River Watershed. Regionally, the surface topography within the Shaw's Creek Subwatershed slopes south toward Lake Ontario. Locally, the Alton municipal wells are situated within a topographic decline, where ground surface topography drops from approximately 400 metres above sea level (masl) at the Water Treatment Plant, to about 390 masl along the banks of a tributary of Shaw's Creek to the north. Near the municipal wells, the Shaw's Creek flows east-west, just north of the municipal wells before transitioning north-south to the east of the municipal wells. The Shaw's Creek then flows south through the Alton Wetland Complex Provincially Significant Wetland (PSW) Complex toward the Credit River. The overland drainage scheme within the municipal wellfield, per local topographic relief, is generally to the north and east toward the Shaw's Creek.

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 Alton municipal wells:

- Halton Till
- Oak Ridges Moraine Complex
- Newmarket Till
- Lower Sediments (including: Thorncliffe Formation, Sunnybrook Drift, and Scarborough Formation)

The Alton municipal wells are screened in a glacial spillway referred to locally as the Alton Meltwater Channel. The Alton Meltwater Channel is generally composed of water bearing glaciofluvial outwash deposits of sand and gravel (GeoKamp, 2015). Collectively, the aquifer materials of the Alton Meltwater Channel make up the regional Oak Ridges Moraine Aquifer Complex (ORAC) hydrostratigraphic unit. The deposits of the ORAC consist primarily of fine sand and silt materials at surface; a mid layer of silt termed the "ORAC Silt"; and coarser sands and gravels occurring locally in the lower parts of the aquifer and are termed the "Lower ORAC Sand". Local to the Alton municipal wells, the ORAC is considered to be an unconfined aquifer unit due to the lack of sufficient confining material offered by the Halton Till (WEL, 2022); however, may have a slightly leaky component to recharge as perhaps due to finer materials in the shallow zone of the aquifer. The thickness of the ORAC is approximately 15-20 m in the area of the Alton municipal wells.

A surficial geology map capturing the Alton municipal wellfield is included as **Figure 4**. Hydrostratigraphic cross-sections taken through ALT 3 and ALT 4A 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) and accessed through the ORMGP, indicates that shale bedrock of the Clinton Group and Cataract Group 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, including the Alton Meltwater Channel where ALT 3 and ALT 4A are screened.

A bedrock geology map capturing the study area of ALT 3 and ALT 4A is included as **Figure 6**.

2 Groundwater and Surface Water Level Summary

2.1 Groundwater and Surface Water Level Monitoring Scope

A summary of the groundwater and surface water 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 Alton municipal wellfield monitoring program included 12 groundwater monitoring stations capturing shallow, intermediate, and deep aquifer horizons, and 4 surface water monitoring stations. The monitoring locations are illustrated on **Figure 1**.

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

- Above ground inspection of monitoring wells, drivepoints, and surface water staff gauges 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;
- Installation of seasonal groundwater and surface water level monitoring level loggers in April 2025 and retrieval of the same in November 2025;
- Replacing missing, inoperable, or damaged level loggers with Region of Peel supplied spares, including shipping select inoperable level loggers to Solinst Canada Ltd. for repair and/or data retrieval;
- Downloading level loggers in the field at 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 hosted; and
- Compiling continuous and static groundwater and surface water 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.

Between April and November 2025, WEL downloaded continuous groundwater and surface water levels from level loggers installed in the seasonal monitoring locations for the Alton municipal wellfield. Continuous groundwater level monitoring data at all permanent (non-seasonal) monitoring locations was downloaded online from FlowWorks throughout the entirety of 2025. Continuous groundwater levels and surface water levels from seasonal monitoring locations equipped with level loggers continued to be downloaded in the field and the data was managed by WEL 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 ALT 3 and ALT 4A recorded by the Region of Peel supervisory control and data acquisition (SCADA) system. Operations data from ALT 3 and ALT 4A supplied by the Region of Peel included daily total flow, and maximum, minimum and average groundwater levels.

2.2 Groundwater and Surface Water Level Trends

Table C-1 in **Appendix C** summarizes the groundwater and surface water levels measured from the Alton wellfield during the monitoring period together with water levels that have been collected historically. Historical water 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 to December 2025 within the Alton 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 ALT 3 and ALT 4A, it can be seen that the normal short-term pumping operation of the municipal wells does not result in significant drawdowns at the monitoring wells nor the drivepoint piezometers. ALT TW1-18, being the monitoring well closest to ALT 3 and ALT 4A, and also screened as deep or deeper than ALT 3 and ALT 4A within the Alton Meltwater Channel was the only well with a discernable influence from the short-term pumping of the municipal wells; however, the drawdowns were minor and short-term in nature. While a response to pumping is also expected at ALT EW4-18S/D, the monitoring data suggests it is more muted to negligible in comparison to ALT TW1-18. As a result, the Alton Meltwater Channel in the area of ALT 3 and ALT 4A could be considered slightly leaky. Considering the unconfined to slightly leaky nature of the aquifer, the zone of influence of the pumping is more localized to the pumping wells.
- Groundwater and surface water elevations between January 2025 and December 2025, inclusive, displayed an expected range of seasonal variability. Overall, groundwater levels rose in the spring monitoring period (April to June) from their January lows before receding again in the summer monitoring period. These groundwater level trends have also been observed historically by the Region of Peel (2022) and WEL (2023 and 2024).
- Shallow drivepoint piezometers and surface water staff gauges are influenced by precipitation, which was shown to be captured by level loggers instrumented at those locations as infiltration or inputs to surface water flow from runoff. The operations of the municipal wells had no discernable influence on the groundwater levels measured in the drivepoints nor surface water levels measured at the staff gauges installed.

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

Included at the end of **Appendix C** is a hydrograph illustrating static groundwater levels at ALT 3 and ALT 4A over the previous 5 years. As evidenced in this hydrograph, static groundwater levels fluctuate within a normal range of variability under non-pumping conditions. Based on these monitoring results, there have been no significant changes in the groundwater resources available to ALT 3 and ALT 4A. 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 and surface water 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 that occur within the Alton wellfield. In all, 9 groundwater monitoring locations and 1 surface water monitoring location were included in the water quality sampling program for 2025. In 2025, water quality sampling in the Alton wellfield was completed in April and May 2025, with ALT TW1-18 and ALT EW3-2 additionally sampled for PFAS parameters in February, August, and November 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 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.

Surface water quality samples were collected in-stream by grab methodology whereby a clean sample bottle not containing preservative was dunked into a well mixed part of the stream and decanted into subsequent sampling bottles. Field-filtered samples were collected for metals only, using a handheld pump and an inline 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) are included in **Appendix E**.

3.2 Groundwater and Surface Water 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:

- With exception of an exceedance of the MAC for Nitrate at ALT EW3-3, all other samples reported no exceedances of the MACs. Additionally, Nitrate concentrations recorded at ALT DP1-04 were greater than 50% the MAC;

- Concentrations for chloride were below the ODWS AO of 250 mg/L, although ALT EW4-18D and ALT DP1-04 were observed to have a chloride concentration of over 200 mg/L;
- VOC, BTEX, and PHC parameters were reported as non-detect at locations where those parameters were sampled; and
- Per- and polyfluoroalkyl substances (PFAS) were sampled in February, May, August, and November, at ALT TW1-18 and ALT EW3-2. PFAS compounds were reported at non-detect, with the exception of PFBA, PFPeA, PFHxA, PFOA, and PFOS at ALT EW3-2, and PFBA, PFPeA, PFHxA, PFOA, PFHpA, PFNA, FPDA, PFOS, and 6:2 fluorotelomer sulfonic acid at ALT TW1-18. 2025 is the first year in which PFOA was observed at ALT EW3-2, since PFAS sampling began at this location in 2019. Concentrations have remained relatively stable since 2019; however, concentrations in 2026 were all observed to be slightly higher or stable in comparison to 2024. ALT TW1-18 PFAS sampling was initiated in 2025, and a number of PFAS compounds was observed.

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

The monitoring location ALT EW3-3 has reported an increasing trend in Nitrate concentrations over the previous 10 years; however, as evidenced in the Nitrate time-concentration plot, those other monitoring locations have established neutral or descending trends in Nitrate concentrations or, as is the case for ALT DP1-04 and ALT EW4-18S, fluctuate within a historical range based on available monitoring data. Review of available raw groundwater quality data from ALT 3 and ALT 4A over the previous 10 years has revealed that Nitrate concentrations are consistently below 50% of the MAC and fluctuate seasonally, being generally lower during the winter months and higher during the spring/summer months. These observations suggest that the source of Nitrate is localized to the area of ALT EW3-3 and that the plume does not extend to other sampling locations at this time. Nearby to ALT EW3-3 there is a noted higher density of residential properties as well as a gas station and commercial businesses, and it has been previously concluded that the source of Nitrate to ALT EW3-3 is predominantly private septic systems in the area. The seasonality in Nitrate concentrations at ALT 3 and ALT 4A also suggests that runoff and infiltration from snowmelt/precipitation within the Alton wellfield also contribute nutrients to the groundwater system. In light of the continuing trends observed in 2025, sampling for Nitrate at the monitoring wells and the raw water of the production wells should continue to determine if the plume is expanding to the production wells.

PFAS, including PFPeA, PFHxA, and PFOS, continue to be reported at relatively stable concentrations at ALT EW3-2 since 2019 where PFAS were first sampled in the Alton wellfield, with a new observation of PFOA in 2025. PFAS sampling at ALT TW1-18 was introduced in 2025, and detections were reported for PFBA, PFPeA, PFHxA, PFOA, and PFOS at ALT EW3-2, and PFBA, PFPeA, PFHxA, PFOA, PFHpA, PFNA, FPDA, PFOS, and 6:2 fluorotelomer sulfonic acid. Including those aforementioned, the sum of a subset of 25 PFAS (Health Canada, 2024) compounds at ALT TW1-18 was calculated to be between 48.1 to 66.2 ng/L over the four

monitoring events in 2025. This range is above the Health Canada objective of 30 ng/L, while the range observed at ALT EW3-2 was calculated to be between 9.2 and 17.2 ng/L. Raw groundwater PFAS sampling results at ALT 3 and ALT 4A were available since 2019 and 2024, respectively, and have indicated that PFBA, PFPeA, PFHxA, and/or PFOA are also encountered at the production wells at similar or lower concentrations; showing no adverse trends overall. Sampling for PFAS at ALT EW3-2, ALT TW1-18, and in the raw groundwater at ALT 3 and ALT 4A, as needed, should continue in order to identify any adverse trends in PFAS at the production wells which could be an indication of other anthropogenic influences on local groundwater quality. Given the unconfined to slightly leaky nature of the aquifer, it may be more susceptible to near surface influences and atmospheric deposition.

When assessing concentrations for Chloride and Sodium, concentrations in 2025 generally fall in range with historical sampling results. Moreover, and as reported historically, the shallow monitoring locations nearest roads (ALT EW3-3, ALT PS3-4, and ALT DP1-04) or downgradient of salting activities at the water treatment plant (ALT EW4-18D) are shown to have the highest Chloride concentrations of all sampling locations in the wellfield. Similarly, the concentrations for Sodium at ALT EW3-3 and ALT EW4-18D are also found to be higher than other monitoring locations in the wellfield. Overall, there are established stable to slightly descending trends in Chloride and Sodium concentrations at ALT EW3-3, and while no locations were observed to exceed ODWS Aesthetic Objectives (AOs) in 2025, it is noted that ALT EW4-18S was not included in the groundwater quality monitoring program in 2025, and there were unstable trends that consistently exceeded ODWS AOs in these two parameters at EW4-18S as of 2024 (WEL, 2025). For ALT EW3-3 and ALT EW4-18D, there appears to be wide variability in observed Chloride and Sodium concentrations historically, and that further monitoring data is required to conclude on long-term water quality trends at that location and the impact that source water protection initiatives around winter salting may have.

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 ALT 3 and ALT 4A are offered:

- Groundwater and surface water elevations in 2025 continue to display seasonality in groundwater levels where they generally rise in the spring monitoring period (April to June) from their January lows before receding again in the summer and subsequent autumn monitoring periods. The influence of precipitation and snowmelt on water levels varies by depth and location of the groundwater monitor. Considering groundwater levels collected in 2025, there is no significant difference from the groundwater level variability recorded in 2024 within the monitoring network.
- When compared with flow data from the municipal pumping wells ALT 3 and ALT 4A, it can be seen that the normal short-term pumping operation of the municipal wells does not result in significant drawdowns at the monitoring wells nor the drivepoint piezometers. The normal pumping operations of the wells showed no significant influence on shallow groundwater and surface water resources. The influence of the pumping wells on surrounding monitors depends on the depth, distance, and elevation of those monitors relative to the pumping wells. Wells closer to, and at similar depths to ALT 3 and ALT 4A will experience the greatest influence from pumping.
- In 2025, VOC, BTEX, and PHC parameters were reported as non-detect at locations where those parameters were sampled. Additionally, ALT EW3-3 was the only sampled location to report an exceedance of the ODWS MAC criteria for Nitrate, while all other samples reported no exceedances of parameters with ODWS MACs. Nitrate concentrations continue to rise at ALT EW3-3; however, historical water quality data from the Alton wellfield suggests that the Nitrate plume is not widespread but perhaps more localized to ALT EW3-3. Nitrate concentrations at other monitoring locations are either stable or fluctuating within a range defined by historical monitoring results, including at ALT 3 and ALT 4A.
- PFAS, including PFPeA, PFHxA, and PFOS, continue to be reported at relatively stable concentrations at ALT EW3-2 since 2019 when PFAS were first sampled in the Alton wellfield. Beginning in 2025, PFAS were sampled at ALT TW1-18 and identified PFBA, PFPeA, PFHxA, PFOA, PFHpA, PFNA, FPDA, PFOS, and 6:2 fluorotelomer sulfonic acid. Meanwhile, raw groundwater PFAS sampling results at ALT 3 and ALT 4A that were reviewed since 2019 have indicated that PFAS, including PFBA, PFPeA, PFHxA, and/or PFOA are also encountered at the production wells at similar or lower concentrations. No adverse trends have been identified until now; however, the sum of a subset of 25 PFAS (Health Canada, 2024) compounds at ALT TW1-18 was calculated to be between 48.1 to 66.2 ng/L in 2025. This range is above the Health Canada objective of 30 ng/L.

4.2 Recommendations

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

- Continue the current groundwater and surface water 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;
- Continue the current water quality sampling program to monitor the concentrations for Nitrate in groundwater, focusing on ALT EW3-3 where concentrations continue on an upward trend year-over-year; and
- As there is insufficient data to establish a trend, continue sampling PFAS at ALT TW1-18 and monitor trends in the sum of a subset of 25 PFAS for which a water quality objective is reported (Health Canada, 2024).

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

This report was prepared using scientific principals and professional judgement in the assessment of the available facts and information. The interpretations within this report are based on the limits of the existing information, budgeted scope of work and schedule. The information presented in this document is not to be construed as legal advice.

Watermark Environmental Ltd. relied on information from the Region of Peel, independent sources, and other historical documentation as referenced in this report. The accuracy and completeness of third-party sources was not verified. It is noted that the regulatory guidelines, standards and related documents as they are referenced in this report are subject to interpretation and may change over time.

This report was prepared for the exclusive use of the Region of Peel and the Ministry of the Environment, Conservation and Parks. Any use which a third party makes of this report, or reliance of decisions based on it, are the responsibility of such third parties. Watermark Environmental Ltd. accepts no responsibility for damages, if it were to occur, suffered by any third party as a result of decisions made or actions taken based on this report.

6 References

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Figures

Appendix A

Alton Municipal Wells PTTW P-300-9058863382

Appendix B

Monitoring Network Summary Tables

Appendix C

Groundwater and Surface Water Levels

Appendix D

Groundwater and Surface Water Quality Results

Appendix E

Groundwater and Surface Water Quality Certificates of Analysis