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

2025 – Inglewood Annual Water Level and Water Quality Report

February 2026

Prepared for:
The Regional Municipality of Peel
10 Peel Centre Drive, Suite A, Floor 4
Brampton, ON L6T 4B9

Prepared by:
Watermark Environmental Ltd.
3 Whitehorse Road, Unit 15
Toronto, ON M3J 3G8
www.watermarkenv.ca

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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 Inglewood municipal wellfield. Two (2) municipal production wells, Inglewood Well 3 (ING 3) and Inglewood Well 4 (ING 4), are operated by the Region of Peel Inglewood municipal wellfield.

This report is organized to provide a hydrogeological background on the Inglewood 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 Inglewood Municipal Wells

ING 3 is located at the Region of Peel's Inglewood Water Treatment Plant located at 15964 Hurontario Street, Inglewood, Ontario. ING 4 is located approximately 370 m northwest of ING 3, on the west side of Hurontario Street. Both ING 3 and ING 4 are screened within a sand and gravel aquifer infilling a bedrock valley. The aquifer is known locally as the Cheltenham/Inglewood Buried Bedrock Valley Aquifer Complex (Geokamp, 2016). Further discussion of regional hydrostratigraphy as it relates to the current study is provided in the next section. The locations of the Inglewood municipal wells are illustrated on **Figure 1**. The well construction details for the municipal wells are summarized in **Table 1.1**.

Table 1.1 Inglewood 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
ING 3	4908036	1995	60.5	6.1	48.8 – 54.9	Sand, gravel (Unconfined to Semi-Confined)
ING 4	A173470	2017	59.7	2.7	57.0 – 59.7	Sand, gravel (Semi-Confined)

According to the current PTTW 4521-C8ES9V, the Region of Peel is permitted to take water from the Inglewood municipal wells according to the allotments provided in **Table 1.2**. The current PTTW will expire on June 22, 2028.

Table 1.2 Inglewood Municipal Wells PTTW Summary
Source: Table A from PTTW P-4521-C8ES9V

Well ID	Maximum Volume (L/min)	Maximum Volume (L/day)
ING 3	900	1,296,000
ING 4	900	1,296,000
Maximum Combined Taking Permitted	900	1,296,000

1.2 Geological and Hydrogeological Setting

1.2.1 Physiography

The Inglewood municipal wells are located at the mapped border between the Oak Ridges Moraine (ORM) physiographic region and the Niagara Escarpment physiographic region. While ING 3 is shown to be located within the Niagara Escarpment physiographic region, ING 4 is located in the ORM physiographic region. Both the Niagara Escarpment and ORM physiographic regions are prominent physiographic areas in southern Ontario. The ORM physiographic region is described as having rolling sand hills, hummocky topography and closed surface depressions supplying groundwater recharge. The Niagara Escarpment physiographic region is characterized by the topographic relief between upland and lowland areas on either side of a bedrock ridge, as well as the varying thickness of overburden deposits to the north and south of the bedrock ridge (Chapman, 1984).

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

1.2.2 Topography and Drainage

The Inglewood municipal wells are located just east of the Credit River and are positioned at the border between the Forks of the Credit to Cheltenham Subwatershed and the East Credit River Subwatershed within the Credit River Watershed. Locally, the Inglewood municipal wells are situated in a topographic low between elevated ridges to the south and to the north. The wells are on a shallow slope where ground surface topography drops from approximately 278 meters above sea level (masl) at ING 4, to about 272 masl at ING 3. Near the municipal wells, the Credit River traverses northeast to southwest of the municipal wells, and flows in a southwesterly direction. The overland drainage scheme within the municipal wellfield, per local topographic relief, is generally to the southwest 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 current investigation. The following units overlie the bedrock (from youngest to oldest) in the vicinity of the Inglewood municipal wells:

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

The Inglewood municipal wells are screened in sand and gravel deposits of a buried bedrock aquifer system known locally as the Cheltenham/Inglewood Buried Bedrock Valley Aquifer Complex. Collectively, the aquifer materials make up the Oak Ridges Moraine Aquifer Complex (ORAC). 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 sand and gravel occurring locally in the lower parts of the aquifer, effectively termed the “Lower ORAC Sand”. In the vicinity of the Inglewood municipal wells, the ORAC is considered to be an unconfined to semi-confined aquifer. The aquifer materials generally become more confined to the east as the thickness of the overlying Halton Till Aquitard increases. Both ING 3 and ING 4 have each been determined to be not under the direct influence of surface water (“Non-GUDI”) (Geokamp, 2016). Pump testing of both wells and evidence from annual monitoring have indicated that both ING 3 and ING 4 do influence the shallow groundwater system over a great distance given the connectivity between deep and shallow deposits.

A surficial geology map capturing the Inglewood municipal wellfield is included as **Figure 4**. Hydrostratigraphic cross-sections taken through ING 3 and ING 4 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, including the Cheltenham/Inglewood Buried Bedrock Valley Aquifer Complex where ING 3 and ING 4 are screened.

A bedrock geology map capturing the study area of ING 3 and ING 4 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 Inglewood municipal wellfield monitoring program included 20 groundwater monitoring stations capturing shallow, intermediate, and deep aquifer horizons, and 3 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;
- Excepting DP6-20S/D, which are installed permanently, the 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 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 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.

Continuous groundwater level monitoring data at all permanent monitoring locations was downloaded online from FlowWorks. 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 ING 3 and ING 4 recorded by the Region of Peel supervisory control and data acquisition (SCADA) system. Operations data from ING 3 and ING 4 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 from the Inglewood 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 Inglewood wellfield. After review of the water level monitoring data from 2025, the following conclusions are offered:

- Many of the monitoring locations around ING 3 and ING 4 are shown to be influenced by the pumping of the municipal wells. The magnitude of the influence is correlated to the proximity of the monitors and their screen depths in relation to the pumping wells. Moreover, when ING 4 is pumping, the recorded drawdowns in the monitoring wells surrounding ING 4 are comparably greater than at ING 3. This is anticipated to be the result of the semi-confining nature of the materials local to ING 4, while ING 3 is understood to be unconfined. Drawdowns associated with well pumping are observed to rebound when there is a period of non-pumping or reduction in pumping intensity;
- Groundwater levels at most monitoring wells were observed to experience lower groundwater elevations for the summer and fall of 2025 in comparison to the 2024 monitoring season due to prolonged drought conditions experienced over the months of July to September 2025. Over that time, less than half of the historical seasonal precipitation was recorded for many areas of southwestern Ontario leading. These observations were most pronounced at monitoring wells ING EW3-1, ING EW3-2S, ING EW3-2D, ING EW3-3S, and ING EW3-3D. Groundwater elevations at nested monitoring wells ING OW1 and ING OWN were also observed to be closer together during this time in 2025 as compared to 2024. It is anticipated that groundwater levels will recover to seasonal normals in 2026 since drought conditions appear to have ended in 2025; and
- Except for drivepoint ING DP6-20D, the drivepoint piezometers around ING 3 and ING 4 are not shown to be influenced by pumping at the municipal wells. Inferring from available hydrostratigraphic information, ING DP6-20D may be screened below the semi-confining clay and gravel layer underlying the area at ING 4, while all other shallow piezometers are screened above this layer. This could explain why an influence from pumping is observed only at ING DP6-20D and not at others.

Considering groundwater levels collected in 2025, there were minor differences from the groundwater level variability recorded in 2023 and 2024 within the monitoring network due to the drought conditions experienced over the summer and early fall months. However, as the drought conditions appear to have ended in 2025, there have been no unexpected changes in the groundwater and surface water levels within the municipal wellfield. Therefore, the current operations of the Inglewood municipal wells are sustainable at present.

Included at the end of **Appendix C** is a hydrograph illustrating static groundwater levels at ING 3 and ING 4 over the past 5 years. As evidenced in this hydrograph, static groundwater levels fluctuate within a normal range of variability. Based on these monitoring results, there have been no significant changes in the groundwater resources available to ING 3 and ING 4. 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 that occur within the Inglewood wellfield. In all, 7 groundwater monitoring locations were included in the water quality sampling program for 2025. There is currently no surface water sampling in the Inglewood wellfield. In 2025, water quality sampling in the Inglewood wellfield was completed in April 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 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. Considering Nitrate concentrations in the Inglewood wellfield, all except that at monitoring well ING EW3-3S were reported as non-detect, which is an observation continuing from 2023 and 2024;
- Concentrations for Chloride and Sodium were generally below the ODWS AOs of 250 mg/L and 200 mg/L, respectively, except for monitoring well ING EW3-3S, which was the only sample reported above the AO for both parameters;

- Samples collected from monitoring well ING EW3-2S reported concentrations for Arsenic and Barium over 25% of the ODWS MACs for those parameters. In the last 10 years, the concentrations for Arsenic and Barium at monitoring well ING EW3-2S have been stable, with no indication of increasing or decreasing trends from current concentrations. It is noted that Arsenic concentrations appear to vary depending on the season, having marginally higher concentrations in the spring as compared to the fall. It is also noted that monitoring well ING EW3-3S has historically reported concentrations for Barium greater than 25% of the MAC; however, the concentrations observed at this well have decreased significantly since 2023; 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 appended 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. Nitrate concentrations reported in monitoring well ING EW3-3S, while still below the MAC, have demonstrated an established stable trend around approximately 3-4 mg/L. The Region of Peel (2022) has identified residential septic systems in the area as a potential source of Nitrate. Review of the aerial imagery of the local area also showed that agricultural practices upgradient of the monitored wells could be an additional source of nutrients. In light of the slightly elevated Nitrate concentrations at monitoring well ING EW3-3S in comparison to other sampled wells, sampling for Nitrate at the monitoring wells and the raw water of the production wells should continue in order to identify changing trends in the intermediate and deep groundwater horizons. Nitrate concentrations have been reported as non-detect at ING 3 and ING 4 in all samples that were reviewed in the previous 10 years, including 2025.

When assessing concentrations for Chloride and Sodium, concentrations in 2025 generally fall in range with historical sampling results and below the respective AOs of those parameters. The one exception, similar to the previous discussion of Nitrate, is the shallow monitoring well ING EW3-3S. Both Chloride and Sodium concentrations have demonstrated an increasing trend over the previous 10 years. These trends are likely to be associated with road salting on Hurontario Street and potentially septic system effluent. It is noted that the monitoring well ING EW3-3S is the shallowest well nearest to the road and residential/commercial properties of all the monitoring locations in the Inglewood wellfield.

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 ING 3 and ING 4 are offered:

- Groundwater and surface water elevations historically and in 2025 continue to display similar seasonal trends, except for a number of locations observed to be influenced by temporary drought conditions in the summer and fall of 2025. Those drought conditions appear to have ended in 2025; therefore, more regular seasonal observations are anticipated in 2026.
- Many of the monitoring locations around ING 3 and ING 4 are shown to be influenced by the pumping of the municipal wells. The magnitude of the influence is correlated to the proximity of the monitors and their screen depths in relation to the pumping wells Moreover, when ING 4 is pumping, the recorded drawdowns in the monitoring wells surrounding ING 4 are comparably greater than at ING 3. This is anticipated to be the result of the semi-confining nature of the materials local to ING 4, while ING 3 is understood to be unconfined. Drawdowns associated with well pumping are observed to rebound when there is a period of non-pumping or reduction in pumping intensity.
- In 2025, VOC, BTEX, and PHC parameters were reported as non-detect at locations where those parameters were sampled, and there were no water quality parameters that exceeded the ODWS MAC at the monitoring locations that were sampled. Concentrations of Nitrate at monitoring well ING EW3-3S continue to be reported below the MAC criteria but, in keeping in-line with historical concentrations, are elevated from all other sampling locations. The concentrations of Chloride and Sodium at monitoring well ING EW3-3S are also both continuing on an upward trajectory from historical concentrations. ING EW3-2S was observed to have Arsenic and Barium concentrations over 25% of the respective parameters' ODWS MAC, as has been observed historically, with no increasing trends.

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; and

- Continue the current water quality sampling program to monitor the concentrations for Nitrate in groundwater, focusing on monitoring well ING EW3-3S where concentrations continue to be reported below the MAC but are above those of any other sampling location. Sampling for Chloride and Sodium should also continue considering the upward trends reported for these parameters at monitoring well ING EW3-3S.

5 Signatures

Ian Gardiner, P.Eng.
Project Engineer

Victor Marcucci, P.Eng.
Hydrogeologist

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

Inglewood Municipal Wells PTTW 4521-C8ES9V

Appendix B

Monitoring Network Summary Tables

Appendix C

Groundwater and Surface Water Levels

Appendix D

Groundwater Quality Results

Appendix E

Groundwater Quality Certificates of Analysis