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**2025 Biennial Groundwater Monitoring
Report - Wilmot Centre Well Field
(K50, K51, K52)**

The Region of Waterloo



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2025 Biennial Groundwater Monitoring Report - Wilmot Centre Well Field (K50, K51, K52)

The Region of Waterloo

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R.J. Burnside & Associates Limited

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1.0 Introduction

The Regional Municipality of Waterloo (the Region) is unique in Ontario in that it is the largest urban municipality to rely almost exclusively on groundwater supplies for its drinking-water (Region of Waterloo, 2015). Figure 1 shows the location of municipal well fields within the Region.

The Permit to Take Water (PTTW) for the Wilmot Centre Well Field (K50, K51, K52), (4874-9SGL5L) requires submission of a well field specific biennial report to the Ministry of Environment, Conservation and Parks (MECP) which documents production well pumping volumes and water levels in specific monitoring wells during 2024 and 2025. The Wilmot Centre PTTW expired on May 31, 2024 and a new PTTW P-300-4271733410 was issued to the Region for the Wilmot Center well field on July 13, 2024. This report has been prepared to meet the reporting conditions of both PTTWs for 2024 and 2025. Copies of the PTTWs are included in Appendix A.

The location of the Wilmot Centre Well Field is shown on Figure 1 and the production wells in Wilmot are shown on Figure 2 with the monitoring network for K50, K51 and K52 shown on Figure 3. Well records for the production and monitoring wells are found in Appendix B.

1.1 Scope of Work

The Region records water levels on a regular basis within a network of monitoring wells to satisfy the requirements of their Permits to Take Water (PTTW) and to confirm that water taking is sustainable in the long term. The monitoring wells are concentrated near the production wells but are also located in known aquifer recharge areas. The data from these wells and regular measurements of pumping volume obtained from the production wells are used to evaluate the impact of Region pumping on aquifers and potential impacts to private wells, other water takers and the natural environment.

The Region has developed a monitoring program for Wilmot Centre Well Field (K50, K51, K52) which consists of the following activities:

- Measuring the daily volume pumped from the K50, K51 and K52 production wells (Condition 4.1 of the PTTWs);
- Measuring the water levels in monitoring wells WT-WC-OW1-00-A, WT-WC-MW4-11-AB and WT-WC-OW8-99-AB (Condition 4.2 of the PTTWs); and
- Review of precipitation data from the nearest GRCA/Environment Canada weather station; and
- Completion of a biennial report (every 2 years) that presents data in compliance with condition 4.3 of the PTTWs.

The Monitoring data (pumped volumes and hydrographs) are found in Appendix C with precipitation data in Appendix D. The monitoring program procedures and methodology are included in Appendix E.

2.0 Site Setting

2.1 Well Field Description

The Wilmot Centre Well Field is located south of Highway 7/8 in the western portion of the Township of Wilmot. Wells K50, K51 and K52 are located on the same Region-owned property (K50s property) on the north side of Bleams Road approximately 3 km southeast of the town of Baden. The closest municipal well fields are Mannheim West about 5 km to the east and Baden about 3 km to the northwest (Figure 2). The closest surface water feature to the Wilmot Center Well Field is the Hunsburger Creek located approximately 200 m northwest of the well field (Figure 3).

2.1.1 Pumping Wells

The production wells associated with the Wilmot Centre Well Field are K50, K51 and K52. The production wells obtain their water from a gravel channel within AFB2 and are screened in the aquifer between 25 and 45 m below ground surface (mbgs). Well records for the production wells are found in Appendix B.

The production wells K50 and K51 are located about 10 m from each other and therefore both wells must be shut down during rehabilitation activities. K52 was constructed in 2013 as an alternate well for the well field that can be utilized when maintenance is required on one of the other wells and was used in 2022 and 2023.

A summary of the production well construction details is provided in Table 1 below.

Table 1: Production Well Construction Details

Well Name	Year Built	Casing/Screen Diameter (mm)	Screened Interval (mbgs)	Aquifer
K50	1970	400	30.2 – 39.3	AFB2
K51	1970	450	30.5 – 39.6	AFB2
K52	2013	406 / 381	30.5 – 38.1	AFB2

The water taking volumes for the Wilmot Centre Well Field are regulated by Condition 3.2 of the PTTWs and are summarized in Table 2 below.

Table 2: Annual Water Taking 2024/2025

Well	PTTW	2024			2025		
		Avg. Daily Water Taking (m ³)	Max Taken per Day (m ³)	Total Volume Pumped (m ³)	Avg. Daily Water Taking (m ³)	Max Taken per Day (m ³)	Total Volume Pumped (m ³)
K50	13,638	4,970	6,049	1,813,989	5,237	6,048	1,911,549
K51	13,638	4,820	6,054	1,759,310	5,659	6,113	2,065,448
K52	13,638	515	549	187,843	507	529	184,931
Total Combined	13,638	10,304	12,277	3,761,142	11,403	12,236	4,161,928

The Region of Waterloo's SCADA system records total daily water taking volumes including the dates and times of water takings, the rates of pumping, and calculations of the total amounts of water pumped per day for each supply well, which complies with condition 4.1 of the PTTWs.

The pumping volumes are based on the total daily volumes as recorded by the Region's SCADA system and are presented in Appendix C as total monthly volumes. Pumping volumes from the well field ranged from 197,162 m³/month to 363,592 m³/month in 2024, and from 223,977 m³/month to 377,092 m³/month in 2025. In total, 3,761,142 m³ was produced at this well field in 2024 and 4,161,928 m³ was produced in 2025. These volumes are similar to volumes pumped in past five years and below the permitted volume of 4,977,870 m³ per year (Table C-1).

2.1.2 Monitoring Wells

The Region recently updated their well naming protocol and as a result, the well names in EQulS may vary from the names listed on the PTTW. The well names on the PTTW are shown below along with the updated name that is used by the Region. The updated Region names will be used throughout this report.

Table 3: Well Nomenclature

Monitoring well names as they appear on the PTTW	Revised well names consistent with Region nomenclature
WT-WC-OW1-00	WT-WC-OW1-00-A
WT-WC-MW4A-11	WT-WC-MW4-11-A
WT-WC-MW4B-11	WT-WC-MW4-11-B
WT-WC-OW8A-99	WT-WC-OW8-99-A
WT-WT-OW8B-99	WT-WC-OW8-99-B

Construction and monitoring details of WT-WC-OW1-00-A, WT-WC-MW4-11-AB and WT-WC-OW8-99-AB are described in the table below. Well records for the monitoring wells are provided in Appendix B and locations are shown on Figure 3.

Table 4: Monitoring Well Construction Details

Monitoring Well ID	Year Built	Screened Depth (mbgs)	Screened Formation	Distance to K50/K51 (m)	Distance to K52 (m)
WT-WC-OW1-00-A	2000	4.2 – 5.4	ATB1	35	13
WT-WC-MW4-11-A	2011	32.9 – 35.9	AFB2	35	14
WT-WC-MW4-11-B	2011	24.7 – 27.7	AFB2	35	14
WT-WC-OW8-99-A	1999	40.8 – 46.9	AFB2	200	230
WT-WC-OW8-99-B	1999	25.3 – 31.4	AFB2	200	230

2.2 Regional Geology and Hydrostratigraphy

The following sections provide a brief overview of the regional geology and hydrogeology of the Wilmot Centre Well Field. The surficial geology based on regional OGS mapping is provided on Figure 4. The Wilmot Centre Well Field is located on the western flanks of the Waterloo Moraine (Figure 5). Representative cross-sections showing the stratigraphy in the vicinity of the Wilmot Centre Well Field are included as Figures 6, 7 and 8. The cross-section locations are provided on Figure 3.

Note that the cross-sections are provided as a visual aid and do not necessarily contain all wells in the monitoring program for the Wilmot Centre Well Field. The layers displayed were generated from results of the Hydrogeological Characterization and Conceptual Model Tier 3 Assessment Update Project (Aqua Insight et al, 2023) and associated hydrogeological modelling work and may not necessarily match layers identified through borehole log interpretation.

The recently completed Tier Three Assessment Update Project (Aqua Insight et al, 2023) has revised the previous (Matrix 2015) stratigraphic interpretation of the lithology around the Wilmot Centre Wellfield. The lithological layers were updated in accordance with documentation provided in the Numerical Model Surface Transfer memorandum (Aqua Insight Inc, 2026).

Refinements (Aqua Insight et al, 2023) of the cross-sections (Figure 6, 7 and 8) include the following:

- Addition of surficial layer ATA1 (Whittlesey clay)
- Removal of ATB1 in the area of the production wells
- Thickening of AFB2 and thinning of AFB1
- Increase in elevation of AFB1, ATB2 and AFB2.

2.2.1 Surficial Geology and Conceptual Hydrostratigraphy

The surficial geology of the Study Area has been mapped and described by the Ontario Geological Survey (2003) and updated in Bajc and Shirota (2007). The surficial geology of the Wilmot Centre Well Field is characterized primarily by ice contact stratified sand and gravel deposits and some silty to clayey till sediments (Figure 4). Modern Alluvial and organic deposits are present along Silver Spring Creek.

The Quaternary units typically present within the Waterloo Moraine are briefly described below, in order from youngest to oldest.

Aquitard ATA1 – Whittlesey Clay

This silt and clay unit is present at surface across the section and corresponds to glaciolacustrine Whittlesey clay (Bajc and Shirota, 2007). This unit forms a laterally extensive, low-permeability aquitard that restricts infiltration and provides partial confinement to the underlying aquifer.

Aquitard ATB1 - Tavistock Till

Aquitard 1 consists of low permeability, spatially discontinuous, surficial till units found predominantly along the flanks of the Waterloo Moraine. Along the western flank of the Moraine, Aquitard 1 corresponds to the Mornington, Stratford and Tavistock Tills; whereas along the eastern flank of the Moraine this unit corresponds to the Upper Maryhill and Port Stanley Tills (Bajc and Shirota, 2007). Along the western portion of the Moraine in the vicinity of the Wilmot Center wellfield, ATB1 generally corresponds to the dark brown clayey silt Tavistock Till.

Aquifer AFB1 / ATB2 / AFB2 – Upper Waterloo Moraine Stratified Sediments and Equivalents

Aquifer AFB1 / AFB2 represents the main water supply aquifer in the core areas of the Waterloo Moraine, including the Wilmot Centre Well Field production wells. These units are generally comprised of layered silt and fine sand to coarse sand and gravel. Throughout the core areas of the Moraine (Figure 5), the unit typically exceeds 45 m in thickness. In some areas, the Upper Waterloo Moraine is interpreted to be bisected by the middle Maryhill Till (ATB2), effectively separating the aquifer into two units, AFB1 and AFB2. At the Wilmot Center Wellfield, ATB2 bisects AFB1 and AFB2 at the production wells but pinches out just east of K50 / K51 / K52. As a result, there is a small area with no separation between AFB1 and AFB2. This aquifer is the most prolific aquifer in the Waterloo Region due to its high hydraulic conductivity and transmissivity, lateral extent, and high recharge rate.

Aquitard ATB3 – Lower Maryhill Till

The Lower Maryhill Till is described as a clayey silt to silty clay till. This unit represents one of the primary regional aquitards due to its strong influence on the groundwater flow system within the Waterloo Moraine. This unit is extensive within the core area of the Waterloo Moraine, and along the eastern flank tends to be thin, discontinuous, or re-worked and re-deposited as glaciofluvial sediments.

Aquitard ATC1 / ATC2 – Catfish Creek Till

The Catfish Creek Till was deposited by a major glacial advance from the north to northeast that covered all of southern Ontario. It is a dense, stony, sandy silt to silty sand till with little clay content. The hydrogeologic properties of the Catfish Creek Till are variable, ranging from a good aquitard to a poor aquifer, depending on local lithology, degree of compaction, and the presence of overlying aquitard units. The Catfish Creek Till is typically thickest in the core area of the Waterloo Moraine, and thin or absent along the eastern flank.

Aquifer AFD1 – Pre-Catfish Creek Sand and Gravel

Pre-Catfish Creek Till aquifer corresponds to sands and gravel re-worked from Catfish Creek and Pre-Catfish Creek Tills and represents the main supply aquifer in several production wells in the Cities of Kitchener and Waterloo. This unit is spatially discontinuous throughout much of the core areas of the Waterloo Moraine but is shown as a thin layer in the regional model.

Aquitard ATE1 – Canning Drift

The Canning Drift is comprised of till and associated fine-textured lake deposits. It is typically found at depths greater than 70 mbgs in the Waterloo Moraine area and is identified to be discontinuous and limited in lateral extent and thickness. Where it is absent, a hydraulic connection is present between the deep overburden aquifers and the underlying bedrock.

Aquifer AFF1 – Pre-Canning Till

The Pre-Canning aquifer is characterized by coarse-grained sand and gravel sediments and is typically found within bedrock depressions. This unit is discontinuous throughout the Region, and where present is hydraulically connected with the upper weathered portion of the bedrock aquifer.

2.2.2 Bedrock Geology

The Paleozoic bedrock in the area consists of the Salina and Guelph Formations. The Salina Formation consists of interbedded dolostone, mudstone and shale with lenses of evaporates. The Guelph Formation is cream coloured, medium to thick bedded, fossiliferous grainstones, wackestones and reefal complexes.

2.3 Local Geology

The following description of local geology is based on drilling investigations for the installation of the production wells and monitoring wells of the Wilmot Center Wellfield. Borehole logs are included in Appendix B.

Tavistock Till (ATB1) – ATB1 was encountered at surface at K50, K52, and WT-WC-OW1-00-A. The unit is approximately 23 m thick at K52 and 20 m thick at K50. WT-WC-OW1-00-A is screened in a silty sand layer within the Till.

Upper Waterloo Moraine (AFB1/AFB2) – This unit is present at the Wilmot Center Wellfield at depths ranging from 5 to 60 mbgs. At K50 and K51, this unit is approximately 20 m in thickness with the production wells screened from approximately 30 m to 40 mbgs within sand and gravel deposits in AFB2 .

Lower Maryhill Till (ATB3) – At production wells K50, K51 and K52, the top of ATB3 was found around 40 mbgs (Stantec, 2014).

3.0 2024 / 2025 Results

The following sections summarize groundwater levels at monitoring wells in relation to precipitation and water taking from the aquifer (in accordance with condition 4.3 of the PTTWs).

3.1 Precipitation

Longer term precipitation trends can have an impact on water levels in the supply aquifer. To assess the potential influence, monthly precipitation is plotted for comparison to water levels and pumping and presented in Appendix C.

Since variations in precipitation totals can occur throughout the Region due to localized events, monthly precipitation data from the GRCA, University of Waterloo (U of W) or Environment Canada station located closest to the production wells are used. The closest GRCA weather station relative to the Wilmot Centre well field is Laurel Creek station located 10.3 km from the well field. The closest Environment Canada station is the Roseville station (12.3 km southeast of the well field). The locations of the meteorological stations are shown on Figure 1. Annual precipitation data from the past 10 years for all stations are compared with long term averages in Table D.1, Appendix D. Monthly precipitation data for the past 10 years at Shades Mills Dam are shown on Figure D.1, Appendix D. At the Wilmot Centre station, the long-term average was calculated from when measurements started until the end of 2025. The Roseville and Region of Waterloo International Airport (WIA) has “Climate Normals” calculated by Environment Canada for 1981 to 2010.

Annual 2024 / 2025 precipitation data for the GRCA and Environment Canada meteorological station closest to the Wilmot Centre well field are presented in Table 5

below. In 2024 Roseville was missing 5 days of data and 20 days in 2025. As a result, the precipitation totals at this station may be under reported.

Table 5: Summary of Precipitation Data

Station	2024 Precipitation (mm)	2024 Deviation (mm)	Long- Term Average (mm)	2025 Precipitation (mm)	2025 Deviation (mm)
Laurel Dam ⁽¹⁾	907	-31	938 ^A	894	-44
Roseville Station ⁽²⁾	856	-63	919 ^B	786	-133
Sources: GRCA (1), Environment Canada (2)					
^A Average annual precipitation since monitoring began to the end of 2025, ^B 1991 to 2020 Normal					

Water levels typically follow a seasonal trend with highest levels occurring in the spring following the snowmelt and lowest levels occurring in July / August. Widespread synoptic rainfall events can also result in Region wide water level responses. Summer thunderstorms tend to be short lived and occur over a smaller area resulting in short term, localized water level rises.

The 2024 total precipitation at Laurel Dam station was 907 mm, which is 31 mm below the long-term average, indicating 2024 was drier-than-average at the well field. A similar below long-term average trend is noted at the Roseville station. The March 1 GRCA snow survey indicated a snowpack across the Region that was low compared to normal.

In 2025, the total precipitation was 894 mm, which is 44 mm below the long-term average. Similarly, the total precipitation at the Roseville station was 133 mm below the long-term average, indicating 2025 was a drier-than-average year. However, Roseville was missing 25 days of data in 2024 / 2025 and as a result, precipitation totals may be under reported. The snow survey conducted by the GRCA on March 15, 2025, showed that the stations in the Region had a high to very high measured snow water equivalent.

3.2 Monitoring Results

In accordance with condition 4.2 of the PTTW, water levels were measured and recorded once per month at the monitoring wells listed in. Hydrographs showing the results of water level monitoring at each monitoring well over the past 10 years are provided in Appendix C. The method used to collect the water levels (manual or electronic) is indicated on the graphs in Appendix C.

WT-WC-OW1-00-A

Water level monitoring at WT-WC-OW1-00-A was completed manually from August 2004 to November 2013, afterwhich a datalogger was installed. The well was

installed within a 1.1 m thick silty sand unit (ATB1). 2024 and 2025 water levels are within historical ranges.

Over the past ten years, water levels have ranged from 356.9 masl to 358.3 masl. Water levels follow a seasonal trend with lowest levels occurring in the summer / early fall and highest levels occurring in the spring and late fall. Short term variations in water levels in response to large precipitation events are also apparent. Changes in pumping have not had a significant effect on water levels since they have remained within a stable range since the start of monitoring despite changes in pumping rates.

WT-WC-MW4-11-AB

Observation wells WT-WC-MW4-11-AB are located on the production well site just north of the K50 property (Figure 3) and completed in AFB2. This well nest is located adjacent to WT-WC-OW1-00-A and was installed as a replacement for OW9-67 which was abandoned in December 2013. Monthly manual monitoring in WT-WC-MW4-11-A began in June 2011, and continuous electronic monitoring began in February 2012. Manual water levels in WT-WC-MW4-11-B are collected monthly.

Over the past ten years, water levels have ranged from 350.9 masl to 353.4 masl. Water levels in both screens respond to pumping with water levels rising approximately 1 m when pumping is reduced in Jan/Feb 2024, September 2024, December 2024 and January 2025. When pumping rates are constant such as in 2020 and 2022, a seasonal trend is observed in both screens. An overall declining trend in water levels is evident beginning in 2020 with water levels at the end of 2025 about 1 m below historical low levels observed before 2020.

WT-WC-OW8-99-AB

Monitoring well nest WT-WC-OW8-99-AB is located approximately 220 m east of the K50's property. Both screens are completed in the production well aquifer AFB2.

Both screens show responses to pumping from K50 / K51 with water levels rising approximately 1 m when pumping is reduced in January / February 2024, September 2024, December 2024 and January 2025. When pumping rates are constant, a seasonal trend is observed in both screens. An overall declining trend in water levels is evident beginning in 2020 with water levels at the end of 2025 about 1 m below historical levels observed before 2020.

4.0 Impact Assessment

4.1 Well Interference

PTTW Condition 5.1 states, "The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such

complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060."

PTTW Condition 5.2 states: "For Groundwater Takings - If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide temporary water supplies adequate to meet their normal requirements or shall compensate such persons for their reasonable costs of doing so. If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected."

There are properties within 500 m of the Wilmot Centre Well Field that are not serviced by municipal water supply. When a well interference complaint is received, the Region has a Well Interference Policy in place. A copy of the policy is presented in Appendix F of the 2019 Biennial Groundwater Monitoring Report – Multiple Well Fields (Burnside, 2020). There were no well interference complaints related to pumping of K50, K51 and K52 received in 2024 and 2025.

The Region continues to feed a pond on a property west of the wells with raw water based on a historical interference complaint. Previous versions of the PTTW for the Wilmot Centre wells included a condition requiring flow augmentation to this pond and the Region has continued to supply it. The pond drains into Hunsburger Creek augmenting baseflow.

A review of the MECP PTTW database did not identify any registered water takings within 2 km of the well field (Figure 3).

4.2 Aquifer Response to Pumping and Precipitation

PTTW Condition 4.3 states: "The Permit Holder shall prepare and submit an electronic copy of a report every two years by June 30. The report shall present the results of the well field water level monitoring for the two preceding calendar years, assesses changes in water levels in the supply aquifer(s) in relation to precipitation and water taking from the aquifer(s)".

The water levels within AFB2 show a response to increases and decreases in pumping at the production wells, as indicated by water level monitoring results at WT-WC-OW8-99-AB, and WT-WC-MW4-11-AB. Water levels in these wells show an overall declining trend after 2020 which corresponds to increased pumping at the production wells but

may also be attributed to climatic influences that have been observed in the AFB2 aquifer across the Region.

Based on monitoring results of WT-WC-OW1-00-A, the water levels in the shallow overburden (ATB1) do not indicate a response to municipal pumping with levels reflecting seasonal trends and short-term responses to large precipitation events. Seasonal fluctuations in the aquifer are observed with the highest and lowest levels observed in spring and late summer / fall, respectively. The correlation of individual precipitation events with groundwater levels is difficult due to several reasons including but not limited to hydraulic conductivity, well depth, precipitation intensity and ground cover conditions.

5.0 Conclusions

Impacts from pumping the municipal wells at the Wilmot Centre Well Field were evaluated through implementation of the Groundwater Monitoring Program. Based on the information contained in the report, Burnside offers the following conclusions:

- The information presented in this report satisfies condition 4.3 of the PTTWs;
- 2024 and 2025 pumping volumes were within the permitted range;
- There were no reported well interference complaints arising from water taking at the Wilmot Centre well field in 2024 and 2025; and
- Water levels in wells screened in AFB2 show a declining trend from 2019/2020 to 2025 that corresponds to increased pumping and climatic effects resulting in historically low water levels at the end of 2025.

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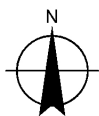
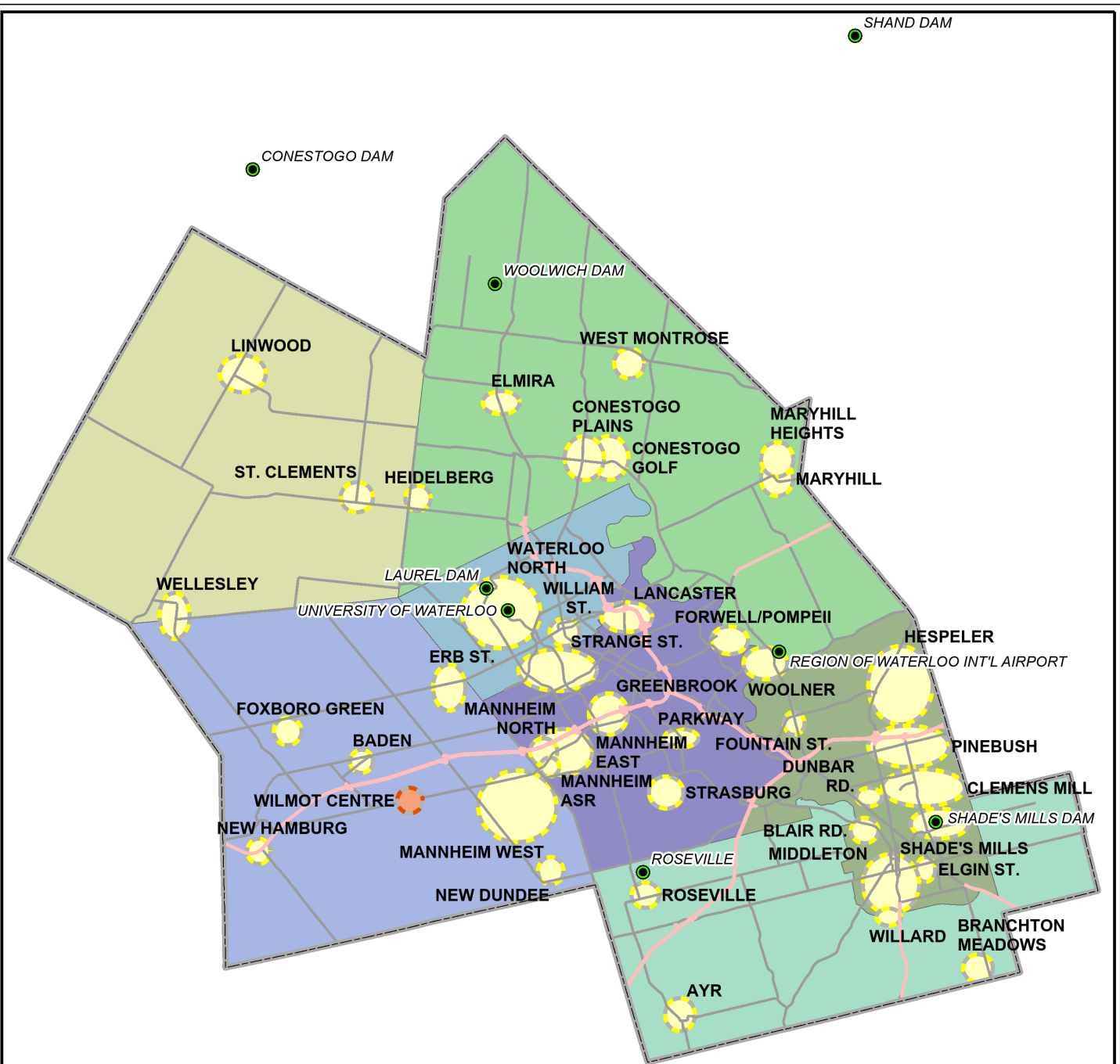


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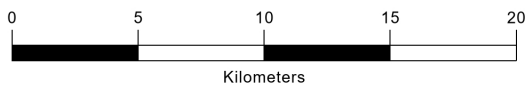
[THE DIFFERENCE IS OUR PEOPLE]



Figures



Data Source:
Region of Waterloo; Includes material © 2012 of the Queen's
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|-------------------------------|-------------------------------------|
| Well Field Location | Township of North Dumfries |
| Well Fields | Township of Wellesley |
| Regional Municipal Boundaries | Township of Wilmot |
| City of Cambridge | Township of Woolwich |
| City of Kitchener | Meteorological Monitoring Locations |
| City of Waterloo | |



Map Title

2025 GROUNDWATER MONITORING REPORT - WILMOT CENTRE WELL FIELD

WELL FIELD LOCATION MAP

Client

REGION OF WATERLOO

Drawn

HN

Scale

1:300,000

Checked

SQ

Date

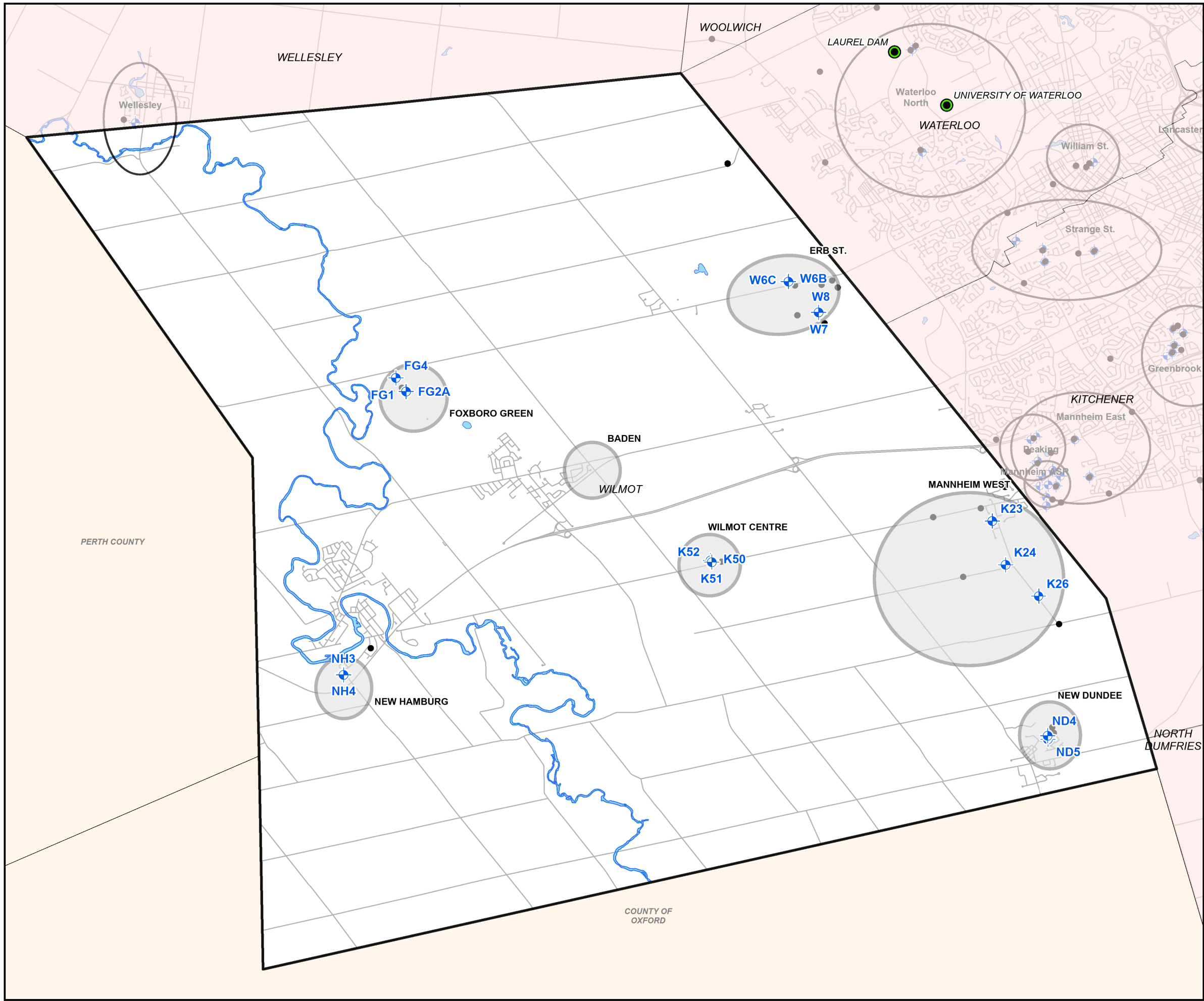
February 2026

Project No.

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Figure No.

1



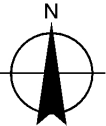
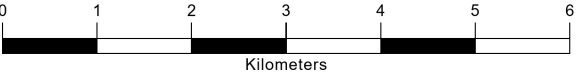
LEGEND

- Production Well Location
- Monitoring Well Location
- Wilmot Municipal Boundary
- Well Fields
- Meteorological Monitoring Locations

Sources:

1. Ministry of Natural Resources, © Queen's Printer for Ontario
2. Natural Resources Canada © Her Majesty the Queen in Right of Canada.
3. Region of Waterloo

Datum: North American 1983 CSRS
Coord. System: NAD 1983 CSRS UTM Zone 17N



Client

REGION OF WATERLOO

Figure Title

**2025 GROUNDWATER MONITORING
REPORT - WILMOT CENTRE WELL FIELD**

**WILMOT WELL FIELDS AND
MONITORING NETWORK**

Drawn	Checked	Date	Figure No.
HN	SQ	March 2026	
Scale		Project No.	
1:80,000		HA0464020	



Data Source:
 1. Ontario Geological Survey 2003, Surficial Geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128.
 2. Region of Waterloo GIS

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> RMOW Supply Well Watercourse Waterbody <p>Surficial Geology</p> <ul style="list-style-type: none"> 5b: Stone-poor, carbonate-derived silty to sandy till (ATA2/ATB1 - Aquitard) | <ul style="list-style-type: none"> 5d: Glaciolacustrine-derived silty to clayey till (ATB1 - Aquitard) 6: Ice-contact stratified deposits (AFB1 - Aquifer) 7a: Glaciofluvial deposits: Sandy deposits (AFA2 - Aquifer) | <ul style="list-style-type: none"> 7b: Glaciofluvial deposits: Gravelly deposits (AFA2 - Aquifer) 8a: Fine-textured glaciolacustrine deposits: Massive-well laminated (ATA1) 19: Modern alluvial deposits |
|---|---|--|

0 1,000 2,000 3,000 4,000 5,000
Meters

- | | |
|--|---|
| <ul style="list-style-type: none"> 20: Organic deposits Sand and Gravel Pit Moraine (Minor) Terrace Drill Hole Sample Location | <ul style="list-style-type: none"> Hummocky Topography Unit Contact Boundary |
|--|---|



Map Title
**2025 GROUNDWATER MONITORING
 REPORT - WILMOT CENTRE WELL FIELD**

SURFICIAL GEOLOGY

Client

REGION OF WATERLOO

Drawn

HN

Scale

1:60,000

Checked

SQ

Date

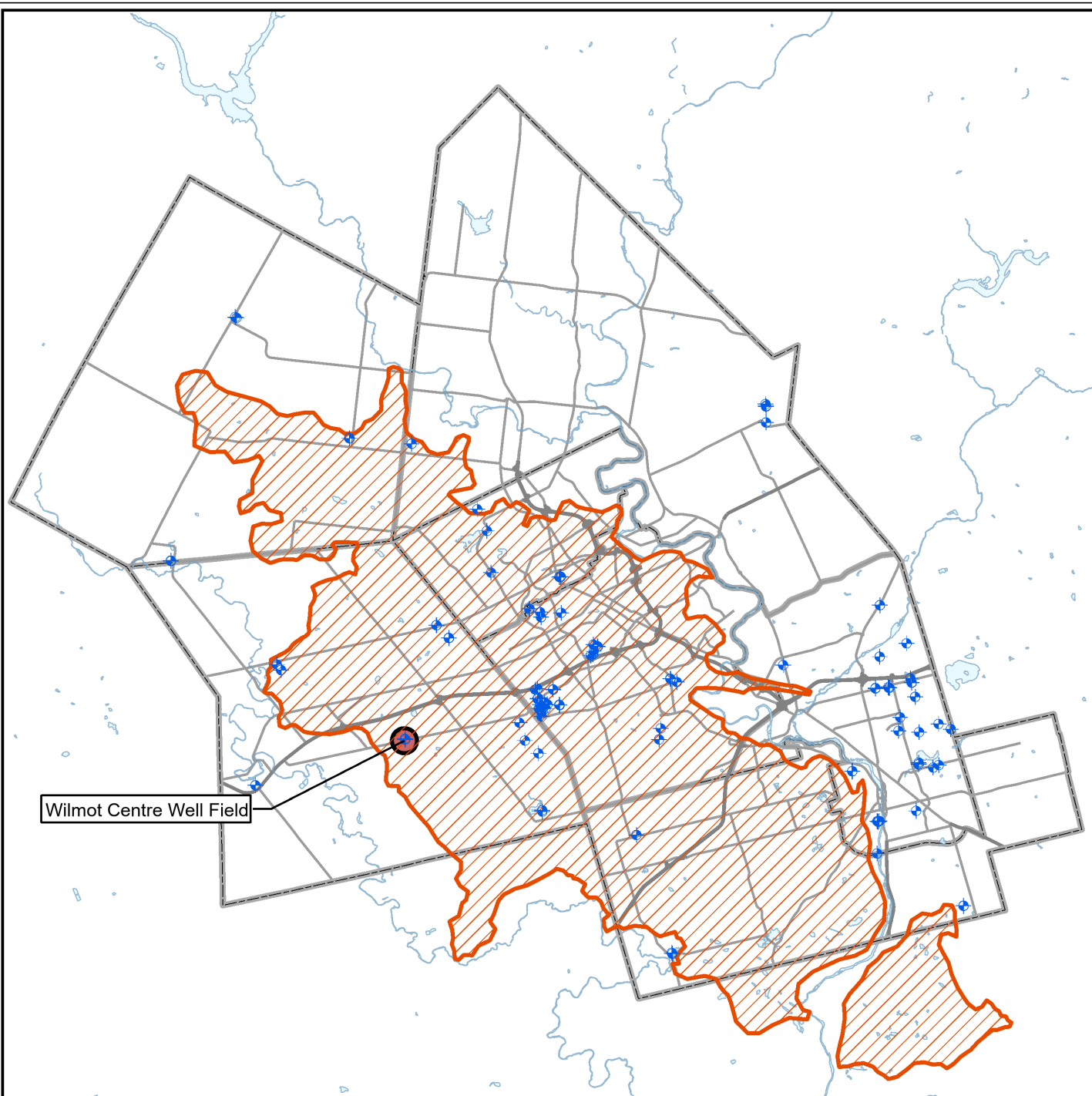
February 2026

Project No.

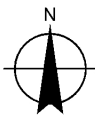
HA0464020

Figure No.

4



Wilmot Centre Well Field



0 5 10 15 20 25
Kilometers

Data Source:
1. Andy F. Bajc, Hazen A.J. Russell and David R. Sharpe (2014) A three-dimensional hydrostratigraphic model of the Waterloo Moraine area, Southern Ontario, Canada, Canadian Water Resources Journal / Revue canadienne des ressources hydriques, 39:2, 95-119
2. Region of Waterloo; Includes material © 2019 of the Queen's Printer for Ontario. All rights reserved.

- RMOW Supply Well
- Waterloo Moraine (2014)
- Wilmot Centre Well Field
- Waterbody
- Regional Municipal Boundaries



Map Title

2025 GROUNDWATER MONITORING REPORT - WILMOT CENTRE WELL FIELD

LOCATION OF THE WATERLOO MORaine

Client

REGION OF WATERLOO

Drawn

HN

Scale

1:300,000

Checked

SQ

Date

March 2026

Project No.

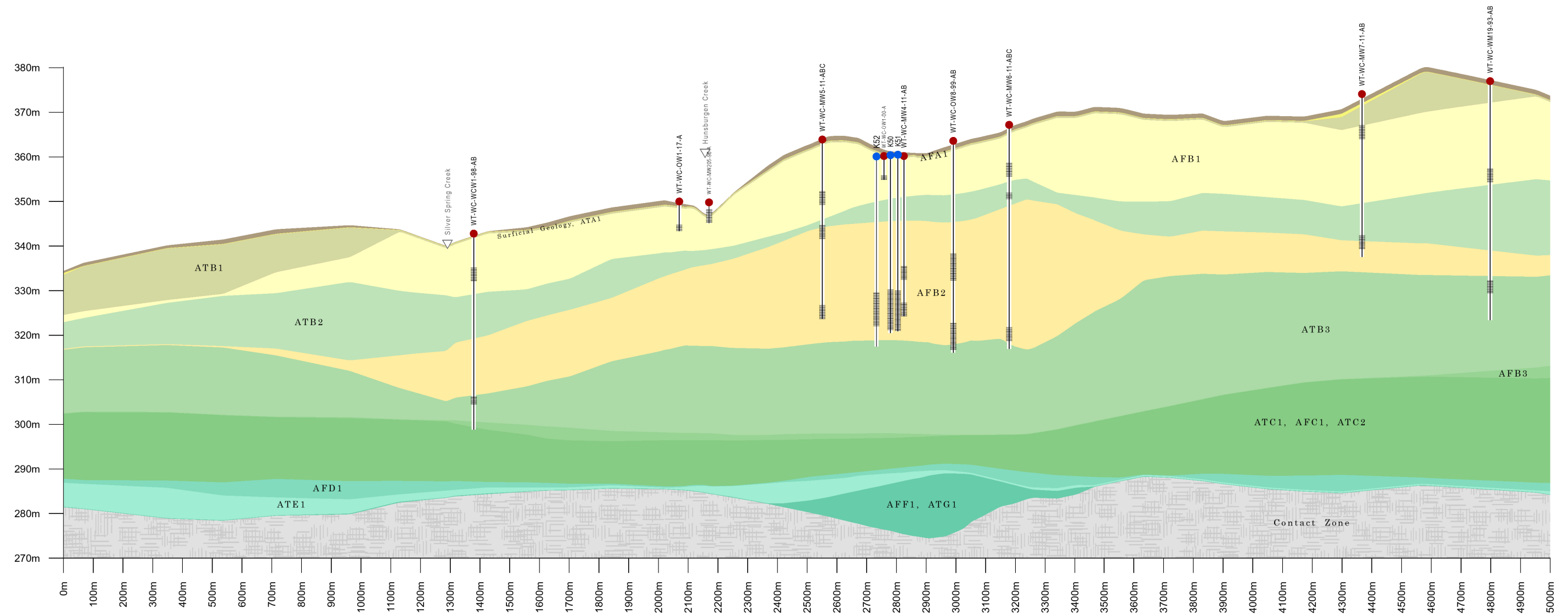
HA0464020

Figure No.

5

A

A'



Wells

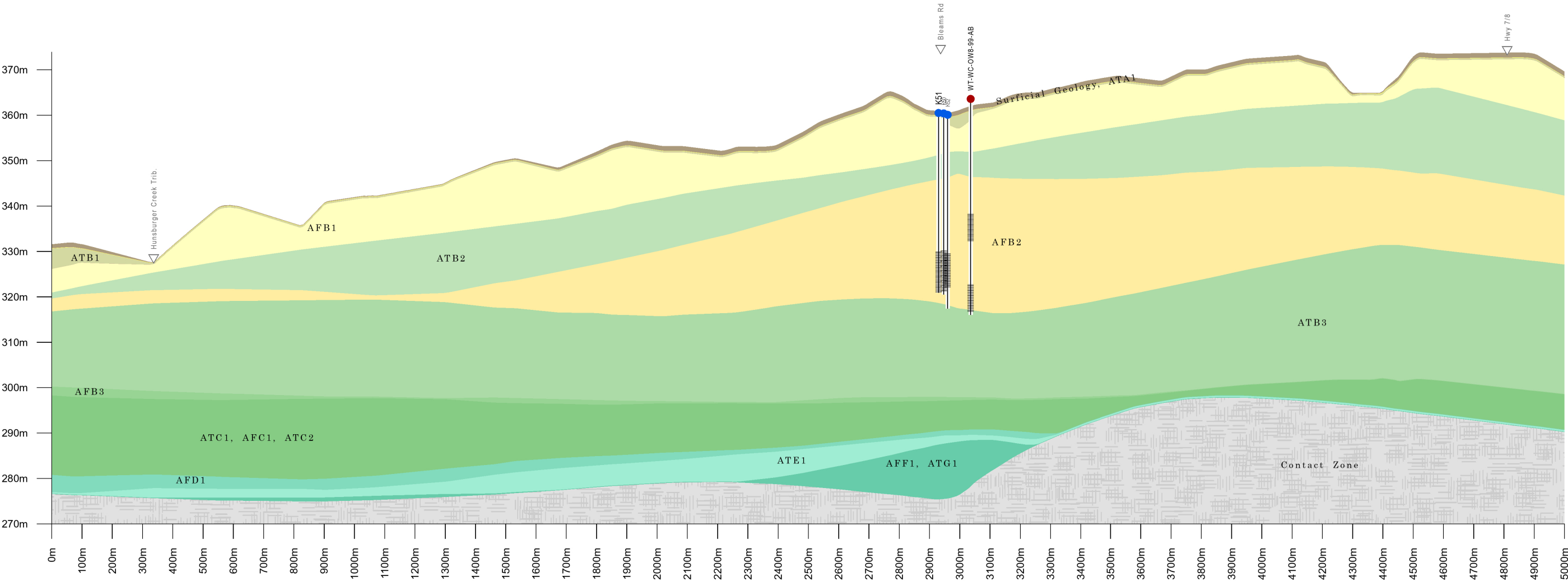
- Production Well (Active) ● Monitoring Well

Moraine Model 2026

Surficial Geology, Whittlesey Clay (ATA1) Whittlesey Sand (AFA1) Upper Maryhill, Port Stanley, Tavistock, Mornington, & Stratford Tills (ATB1)	Upper Waterloo Moraine Stratified Sediments & Equivalents (AFB1) Middle Maryhill Till & Equivalents (ATB2) Middle Waterloo Moraine Stratified Sediments & Equivalents (AFB2)	Lower Maryhill Till & Stratified Equivalents (ATB3) Lower Waterloo Moraine Stratified Sediments or Catfish Creek Till Outwash (AFB3) Upper/Main Catfish Creek Till (ATC1), Middle Catfish Creek Stratified Deposits (AFC1), Lower Catfish Creek Till (ATC2)	Pre-Catfish Creek Coarse-Grained Glaciofluvial/Lacustrine Deposits (AFD1) Canning Drift, Till & Fine Textured Glaciolacustrine Deposits (ATE1) Pre-Canning Coarse Textured Glaciofluvial / Glaciolacustrine Deposits (AFF1), Pre-Canning Coarse Textured Till (ATG1)	Weathered Bedrock	Wellhead Well Screen or Open Hole	BURNSIDE Client REGION OF WATERLOO	Figure Title GEOLOGIC CROSS SECTION REGION OF WATERLOO Wilmot Centre Cross Section A - A'	Drawn		Checked	Date	Figure No.				
PS		DH		2026/06/01												
Horizontal Scale 1:14,000		Vertical Ex.:15x		Project No. HA046402												

B

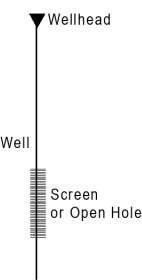
B'



Wells

- Production Well (Active)
- Monitoring Well

 Surfacial Geology, Whittlesey Clay (ATA1)	 Upper Waterloo Moraine Stratified Sediments & Equivalents (AFB1)	 Lower Maryhill Till & Stratified Equivalents (ATB3)	 Pre-Catfish Creek Coarse-Grained Glaciofluvial/Lacustrine Deposits (AFD1)	 Weathered Bedrock
 Whittlesey Sand (AFA1)	 Middle Maryhill Till & Equivalents (ATB2)	 Lower Waterloo Moraine Stratified Sediments or Catfish Creek Till Outwash (AFB3)	 Canning Drift, Till & Fine Textured Glaciolacustrine Deposits (ATE1)	
 Upper Maryhill, Port Stanley, Tavistock, Mornington, & Stratford Tills (ATB1)	 Middle Waterloo Moraine Stratified Sediments & Equivalents (AFB2)	 Upper/Main Catfish Creek Till (ATC1), Middle Catfish Creek Stratified Deposits (AFC1), Lower Catfish Creek Till (ATC2)	 Pre-Canning Coarse Textured Glaciofluvial / Glaciolacustrine Deposits (AFF1), Pre-Canning Coarse Textured Till (ATG1)	



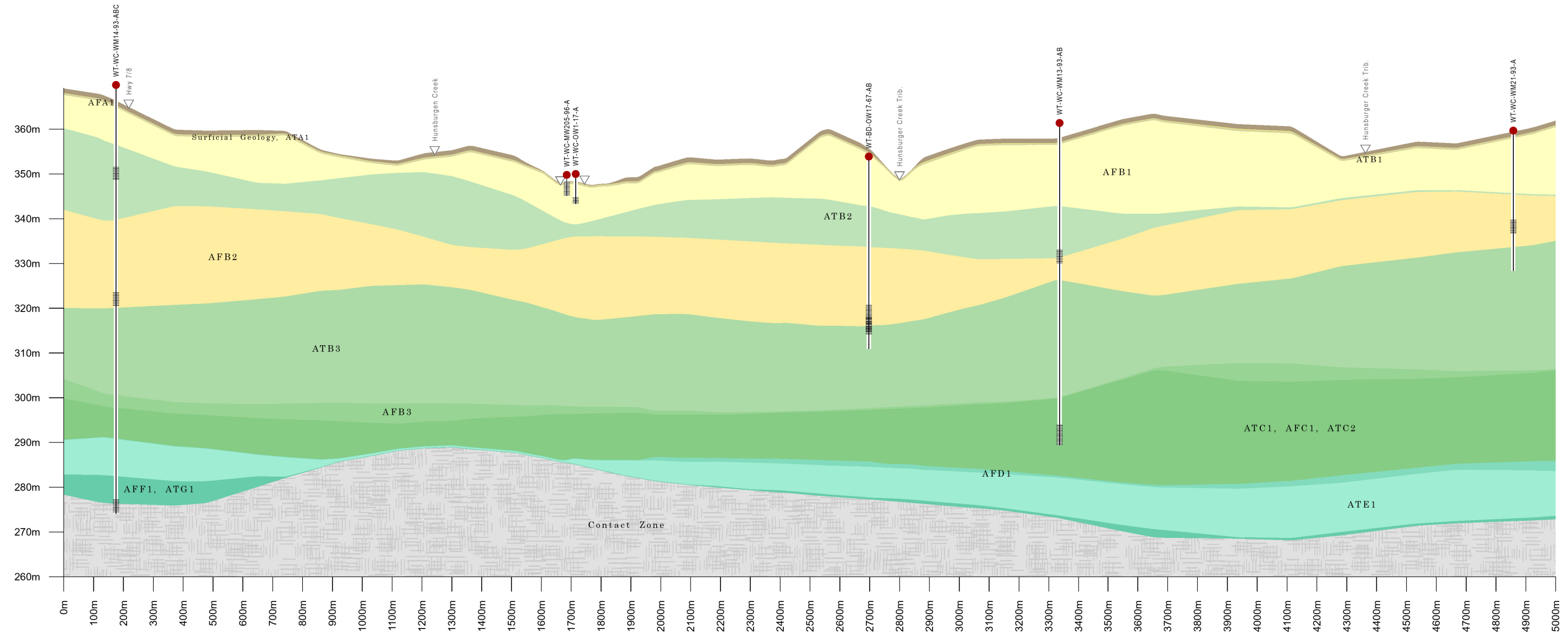
Client
REGION OF WATERLOO

Figure Title
**GEOLOGIC CROSS SECTION
REGION OF WATERLOO**
Wilmot Centre
Cross Section B - B'

Drawn PS	Checked DH	Date 2026/06/01	Figure No. 7
Horizontal Scale 1:14,000		Project No. HA046402	
Vertical Ex.:15x			

C

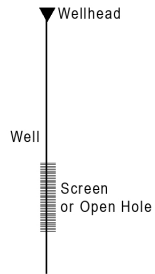
C'



Wells

● Monitoring Well

 Surficial Geology, Whittlesey Clay (ATA1)	 Upper Waterloo Moraine Stratified Sediments & Equivalents (AFB1)	 Lower Maryhill Till & Stratified Equivalents (ATB3)	 Pre-Catfish Creek Coarse-Grained Glaciofluvial/Lacustrine Deposits (AFD1)	 Weathered Bedrock
 Whittlesey Sand (AFA1)	 Middle Maryhill Till & Equivalents (ATB2)	 Lower Waterloo Moraine Stratified Sediments or Catfish Creek Till Outwash (AFB3)	 Canning Drift, Till & Fine Textured Glaciolacustrine Deposits (ATE1)	
 Upper Maryhill, Port Stanley, Tavistock, Mornington, & Stratford Tills (ATB1)	 Middle Waterloo Moraine Stratified Sediments & Equivalents (AFB2)	 Upper/Main Catfish Creek Till (ATC1), Middle Catfish Creek Stratified Deposits (AFC1), Lower Catfish Creek Till (ATC2)	 Pre-Canning Coarse Textured Glaciofluvial / Glaciolacustrine Deposits (AFF1), Pre-Canning Coarse Textured Till (ATG1)	



Client
REGION OF WATERLOO

Figure Title
**GEOLOGIC CROSS SECTION
REGION OF WATERLOO**
Wilmot Centre
Cross Section C - C'

Drawn PS	Checked DH	Date 2026/06/01	Figure No. 8
Horizontal Scale 1:14,000		Project No.	
Vertical Ex.:15x		HA046402	



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Permit To Take Water

AMENDED PERMIT TO TAKE WATERGround Water
NUMBER 4874-9SGL5L

Pursuant to Section 34 of the Ontario Water Resources Act, R.S.O. 1990 this Permit To Take Water is hereby issued to:

The Regional Municipality of Waterloo
Hydrogeology and Source Water - Water Services Division
150 Frederick Street, Floor 7
Kitchener, Ontario N2G 4J3

For the water

taking from: Municipal Wells # K50, K51 and K52

Located at: Lot 3, Concession German Block NBR, Geographic Township of Wilmot
Wilmot, Regional Municipality of Waterloo

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

DEFINITIONS

- (a) "Director" means any person appointed in writing as a Director pursuant to section 5 of the OWRA for the purposes of section 34, OWRA.
- (b) "Provincial Officer" means any person designated in writing by the Minister as a Provincial Officer pursuant to section 5 of the OWRA.
- (c) "Ministry" means Ontario Ministry of the Environment and Climate Change.
- (d) "District Office" means the Guelph District Office.
- (e) "Permit" means this Permit to Take Water No. 4874-9SGL5L including its Schedules, if any, issued in accordance with Section 34 of the OWRA.
- (f) "Permit Holder" means The Regional Municipality of Waterloo.
- (g) "OWRA " means the *Ontario Water Resources Act*, R.S.O. 1990, c. O. 40, as amended.

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. Compliance with Permit

- 1.1 Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, dated July 31, 2014 and signed by Richard Wootton, and all Schedules included in this Permit.
- 1.2 The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.
- 1.3 Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.
- 1.4 This Permit is not transferable to another person.
- 1.5 This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.
- 1.6 The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.
- 1.7 The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change. A change in ownership in the property shall cause this Permit to be cancelled.

2. General Conditions and Interpretation

- 2.1 Inspections
The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the *Environmental Protection Act*, R.S.O. 1990, the *Pesticides Act*, R.S.O. 1990, or the *Safe Drinking Water Act*, S. O. 2002.
- 2.2 Other Approvals
The issuance of, and compliance with this Permit, does not:
 - (a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the *Ontario Water Resources Act*, and the *Environmental Protection Act*, and any regulations made thereunder; or

(b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3 Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

(a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

2.4 Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5 Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6 Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1 **Expiry**

This Permit expires on **May 31, 2024**. No water shall be taken under authority of this Permit after the expiry date.

3.2 Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A

	Source Name / Description:	Source: Type:	Taking Specific Purpose:	Taking Major Category:	Max. Taken per Minute (litres):	Max. Num. of Hrs Taken per Day:	Max. Taken per Day (litres):	Max. Num. of Days Taken per Year:	Zone/ Easting/ Northing:
1	K50	Well Drilled	Municipal	Water Supply	9,547	24	13,638,000	365	17 530894 4803917
2	K51	Well Drilled	Municipal	Water Supply	9,547	24	13,638,000	365	17 530888 4803910
3	K52	Well Drilled	Municipal	Water Supply	9,547	24	13,638,000	365	17 530870 4803951
						Total Taking:	13,638,000		

4. Monitoring

4.1 Under section 9 of O. Reg. 387/04, and as authorized by subsection 34(6) of the *Ontario Water Resources Act*, the Permit Holder shall, on each day water is taken under the authorization of this Permit, record the date, the volume of water taken on that date and the rate at which it was taken. The daily volume of water taken shall be measured by a flow meter or calculated in accordance with the method described in the application for this Permit, or as otherwise accepted by the Director. The Permit Holder shall keep all records required by this condition current and available at or near the site of the taking and shall produce the records for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the records required by this condition to the ministry's Water Taking Reporting System.

4.2 The Permit Holder shall measure and record water levels once a month in the following monitoring wells:

WT-WC-OW1-00
WT-WC-MW4A-11
WT-WC-MW4B-11
WT-WC-OW8A-99
WT-WC-OW8B-99

4.3 The Permit Holder shall prepare and submit a report every two years by June 30 commencing June 30, 2016, that presents the results of the well field water level monitoring for the two preceding calendar years, assesses changes in water levels in the supply aquifer in relation to the precipitation and the water taking from the aquifer, and provides a summary for all interference complaints received by the Permit Holder related to this Permit and reported in the District Office in accordance with Condition 5.1 and the manner which the Permit Holder has dealt with

the complaint.

5. Impacts of the Water Taking

5.1 Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2 For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. Director May Amend Permit

The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the *Ontario Water Resources Act*, Section 100 (4).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.
2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.
3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, as amended, provides that the Notice requiring the hearing shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Permit to Take Water number;
6. The date of the Permit to Take Water;
7. The name of the Director;
8. The municipality within which the works are located;

This notice must be served upon:

*The Secretary
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto ON
M5G 1E5
Fax: (416) 314-4506
Email: ERTTribunalsecretary@ontario.ca*

AND

*The Director, Section 34, Ministry of the
Environment and Climate Change
12th Floor
119 King St W
Hamilton ON L8P 4Y7
Fax: (905) 521-7820*

Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal:

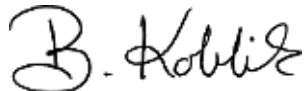
by telephone at (416) 314-4600

by fax at (416) 314-4506

by e-mail at www.ert.gov.on.ca

This Permit cancels and replaces Permit Number 6646-9PXNX4, issued on 2014/10/24.

Dated at Hamilton this 5th day of January, 2015.



Belinda Koblik
Director, Section 34
Ontario Water Resources Act , R.S.O. 1990

Schedule A

This Schedule "A" forms part of Permit To Take Water 4874-9SGL5L, dated January 5, 2015.



PERMIT TO TAKE WATER

Ground Water

NUMBER P-300-4271733410

Version: 1.0

Effective Date: July 13, 2024

Expiry Date: May 31, 2034

Pursuant to Section 34.1 of the Ontario Water Resources Act, Revised Statutes of Ontario (R.S.O.) 1990 this Permit To Take Water is hereby issued to:

REGIONAL MUNICIPALITY OF WATERLOO

150 Frederick Street
6th Floor
KITCHENER
ONTARIO
Canada
N2G 4J3

For the water taking from

K50

K51

K52

Located at:

2324 Bleams Road, Wilmot, Ontario

This Permit cancels and replaces Permit Number 4874-9SGL5L, issued on January 5, 2015.

DEFINITIONS

For the purposes of this Permit, and the terms and conditions specified below, the following definitions apply:

- a. "Director" means any person appointed in writing as a director pursuant to section 5 of the OWRA for the purposes of section 34.1 of the OWRA.
- b. "Provincial Officer" means any person designated in writing by the Minister as a provincial officer pursuant to section 5 of the OWRA.
- c. "Ministry" means the ministry of the government of Ontario responsible for the administration of the OWRA, currently named the Ministry of the Environment, Conservation and Parks.
- d. "District Office" means the Guelph District Office of the Ministry.
- e. "Permit" or "PTTW" means this Permit to Take Water No. P-300-4271733410 including its Schedules, if any, issued in accordance with Section 34.1 of the OWRA, as may amended.
- f. "Permit Holder" means REGIONAL MUNICIPALITY OF WATERLOO.

TERMS AND CONDITIONS

You are hereby notified that this Permit is issued subject to the terms and conditions outlined below:

1. Compliance with Permit

- 1.1. Except where modified by this Permit, the water taking shall be in accordance with the application for this Permit To Take Water, attested to by Frank Kosa, on February 29, 2024, and all Schedules included in this Permit.
- 1.2. The Permit Holder shall ensure that any person authorized by the Permit Holder to take water under this Permit is provided with a copy of this Permit and shall take all reasonable measures to ensure that any such person complies with the conditions of this Permit.
- 1.3. Any person authorized by the Permit Holder to take water under this Permit shall comply with the conditions of this Permit.
- 1.4. This Permit is not transferable to another person without the Director's written consent.
- 1.5. This Permit provides the Permit Holder with permission to take water in accordance with the conditions of this Permit, up to the date of the expiry of this Permit. This Permit does not constitute a legal right, vested or otherwise, to a water allocation, and the issuance of this Permit does not guarantee that, upon its expiry, it will be renewed.
- 1.6. The Permit Holder shall keep this Permit available at all times at or near the site of the taking, and shall produce this Permit immediately for inspection by a Provincial Officer upon his or her request.
- 1.7. The Permit Holder shall report any changes of address to the Director within thirty days of any such change. The Permit Holder shall report any change of ownership of the property for which this Permit is issued within thirty days of any such change.

2. General Conditions and Interpretation

2.1. Inspections

The Permit Holder must forthwith, upon presentation of credentials, permit a Provincial Officer to carry out any and all inspections authorized by the OWRA, the Environmental Protection Act, R.S.O. 1990, the Pesticides Act, R.S.O. 1990, or the Safe Drinking Water Act, S. O. 2002.

2.2. Other Approvals

The issuance of, and compliance with this Permit, does not:

- (a) relieve the Permit Holder or any other person from any obligation to comply with any other applicable legal requirements, including the provisions of the Ontario Water Resources Act, and the Environmental Protection Act, and any regulations made thereunder; or
- (b) limit in any way any authority of the Ministry, a Director, or a Provincial Officer, including the authority to require certain steps be taken or to require the Permit Holder to furnish any further information related to this Permit.

2.3. Information

The receipt of any information by the Ministry, the failure of the Ministry to take any action or require any person to take any action in relation to the information, or the failure of a Provincial Officer to prosecute any person in relation to the information, shall not be construed as:

- (a) an approval, waiver or justification by the Ministry of any act or omission of any person that contravenes this Permit or other legal requirement; or
- (b) acceptance by the Ministry of the information's completeness or accuracy.

2.4. Rights of Action

The issuance of, and compliance with this Permit shall not be construed as precluding or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agency thereof, has or may have against the Permit Holder, its officers, employees, agents, and contractors.

2.5. Severability

The requirements of this Permit are severable. If any requirements of this Permit, or the application of any requirements of this Permit to any circumstance, is held invalid or unenforceable, the application of such requirements to other circumstances and the remainder of this Permit shall not be affected thereby.

2.6. Conflicts

Where there is a conflict between a provision of any submitted document referred to in this Permit, including its Schedules, and the conditions of this Permit, the conditions in this Permit shall take precedence.

3. Water Takings Authorized by This Permit

3.1. Expiry

This Permit expires on May 31, 2034. No water shall be taken under authority of this Permit after the expiry date.

3.2. Amounts of Taking Permitted

The Permit Holder shall only take water from the source, during the periods and at the rates and amounts of taking specified in Table A. Water takings are authorized only for the purposes specified in Table A.

Table A (litres)

	Source Name / Description	Source Type	Purpose Category	Specific Purpose	Activity	Maximum Taken per minute	Maximum Number of Hours Taken per day	Maximum volume per Day	Maximum days in a year	Zone / Easting / Northing
1	K50 (K50)	Well	Public administration	Municipal Supply	Water Supply	9547	24	13638000	365	17 / 530894 / 4803917
2	K51 (K51)	Well	Public administration	Municipal Supply	Water Supply	9547	24	13638000	365	17 / 530888 / 4803910
3	K52 (K52)	Well	Public administration	Municipal Supply	Water Supply	9547	24	13638000	365	17 / 530870 / 4803951
Total Taking								13638000		

4. Monitoring

4.1. The Permit Holder shall maintain a record of all water takings. The daily volume of water taken shall be measured by a flow meter or calculated in accordance with the method described in the application for this Permit, or as otherwise accepted by the Director.

This record shall include the dates and times of water takings, the rates of pumping, and the total amounts of water pumped per day for each day that water is taken under the authorization of this Permit. A separate record shall be maintained for each source. The Permit Holder shall keep all required records up to date and available at or near the site of the taking and shall produce the records immediately for inspection by a Provincial Officer upon his or her request. The Permit Holder, unless otherwise required by the Director, shall submit, on or before March 31st in every year, the records required by this condition to the Ministry's Regulatory Self Reporting System.

4.2. The Permit Holder shall measure and record water levels once a month in the following monitoring wells:

WT-WC-OW1-00
WT-WC-MW4A-11
WT-WC-MW4B-11
WT-WC-OW8A-99
WT-WC-OW8B-99

4.3. The Permit Holder shall prepare a report every two years that: presents the results of the well field water level monitoring for the two preceding calendar years; assesses changes in water levels in the supply aquifer in relation to the precipitation and the water taking from the aquifer; and provides a summary for all interference complaints received by the Permit Holder related to this Permit and reported in the District Office in accordance

with Condition 5.1 and the manner that the Permit Holder has dealt with the complaint. The reports shall be submitted to the Director by June 30th of the reporting year starting June 30, 2026,

5. Impacts of the Water Taking

5.1. Notification

The Permit Holder shall immediately notify the local District Office of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint. The Permit Holder shall immediately notify the local District Office if the taking of water is observed to have any significant impact on the surrounding waters. After hours, calls shall be directed to the Ministry's Spills Action Centre at 1-800-268-6060.

5.2. Impacts for Water Situation Type

For Surface-Water Takings

The taking of water (including the taking of water into storage and the subsequent or simultaneous withdrawal from storage) shall be carried out in such a manner that streamflow is not stopped and is not reduced to a rate that will cause interference with downstream uses of water or with the natural functions of the stream.

For Groundwater Takings

If the taking of water is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those affected, a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or shall reduce the rate and amount of taking to prevent or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of doing so.

If permanent interference is caused by the water taking, the Permit Holder shall restore the water supplies of those permanently affected.

6. Director May Amend Permit

6.1. The Director may amend this Permit by letter requiring the Permit Holder to suspend or reduce the taking to an amount or threshold specified by the Director in the letter. The suspension or reduction in taking shall be effective immediately and may be revoked at any time upon notification by the Director. This condition does not affect your right to appeal the suspension or reduction in taking to the Environmental Review Tribunal under the Ontario Water Resources Act, Section 100 (4).

REASONS

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is included to ensure that the conditions in this Permit are complied with and can be enforced.
2. Condition 2 is included to clarify the legal interpretation of aspects of this Permit.
3. Conditions 3 through 6 are included to protect the quality of the natural environment so as to safeguard the ecosystem and human health and foster efficient use and conservation of waters. These conditions allow for the beneficial use of waters while ensuring the fair sharing, conservation and sustainable use of the waters of Ontario. The conditions also specify the water takings that are authorized by this Permit and the scope of this Permit.

APPEAL PROVISIONS

In accordance with Section 100 of the *Ontario Water Resources Act, R.S.O. 1990*, you may by written notice served upon me and the Ontario Land Tribunal within 15 days after receipt of this notice, require a hearing by the Tribunal. Section 101 of the *Ontario Water Resources Act, R.S.O. 1990*, as amended, provides that the notice requiring the hearing ("the Notice") shall state:

1. The portions of the Permit or each term or condition in the Permit in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

In addition to these legal requirements, the Notice should also include:

- a. The name of the appellant;
- b. The address of the appellant;
- c. The permit to take water number;
- d. The date of the permit to take water;
- e. The name of the Director;
- f. The municipality within which the works are located;

This Notice must be served upon:

Registrar*		The Director, Section 34.1,
Ontario Land Tribunal		Ministry of the Environment, Conservation and Parks
655 Bay Street, Suite 1500	and	5775 Yonge Street, 8 th Floor
Toronto ON		Toronto, ON
M5G 1E5		M2M 4J1
OLT.Registrar@ontario.ca		Fax: (416) 325-6347

*** Further information on the Ontario Land Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349 or 1 (866) 448-2248, or www.olt.gov.on.ca**

Dated at Hamilton this 12th day of July, 2024



Matthew Corriveau

Director, Section 34.1

Ontario Water Resources Act, R.S.O. 1990

c: Frank Kosa
Karl Belan, REGIONAL MUNICIPALITY OF WATERLOO

SCHEDULE 1

This Schedule "1" forms part of Permit To Take Water P-300-4271733410 Version Number 1.0, dated July 12, 2024.



BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Well Records

Outer Casing

71.5 - 30" Ø 37524

Inner Casing

99' - 10" Ø 37524

Screen

30' 16" Ø No. 6 23 LAYNS

Plug

33 PLUGS

Gravel

18 TONS 1/2" X 1/2"

Pump

No. 70782

Setting BP-MB 100'-0"

No. Stages 4

Length Bowl 5'-2"

Bowl 12" T&C

Size & Lgth. Suction 10'

Head 10181

Size Column 10" X 1 1/2" 35

Materials or setting details other than stand
Impellers: Trim ZINC 34854

Motor

Make WESTING HOUSE

Phase 3

H. P. 100

Cycles 60

R. P. M. 1775

Volts 575

Type H.S.B.

Amps. 91

Frame 404 TP

Serial 1-1957102

Bearing Nos. 7222

- 63147723

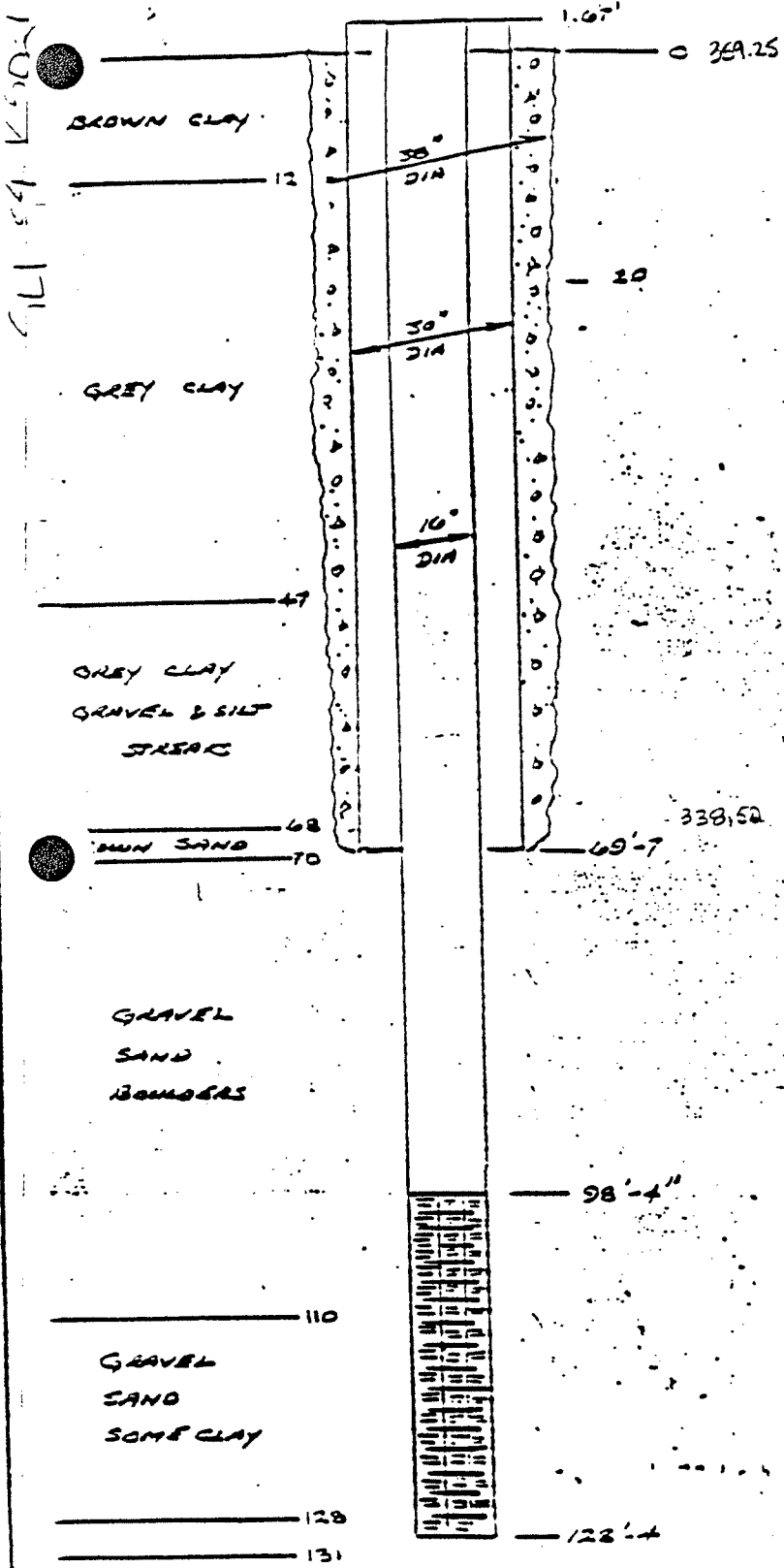
Special Equipment

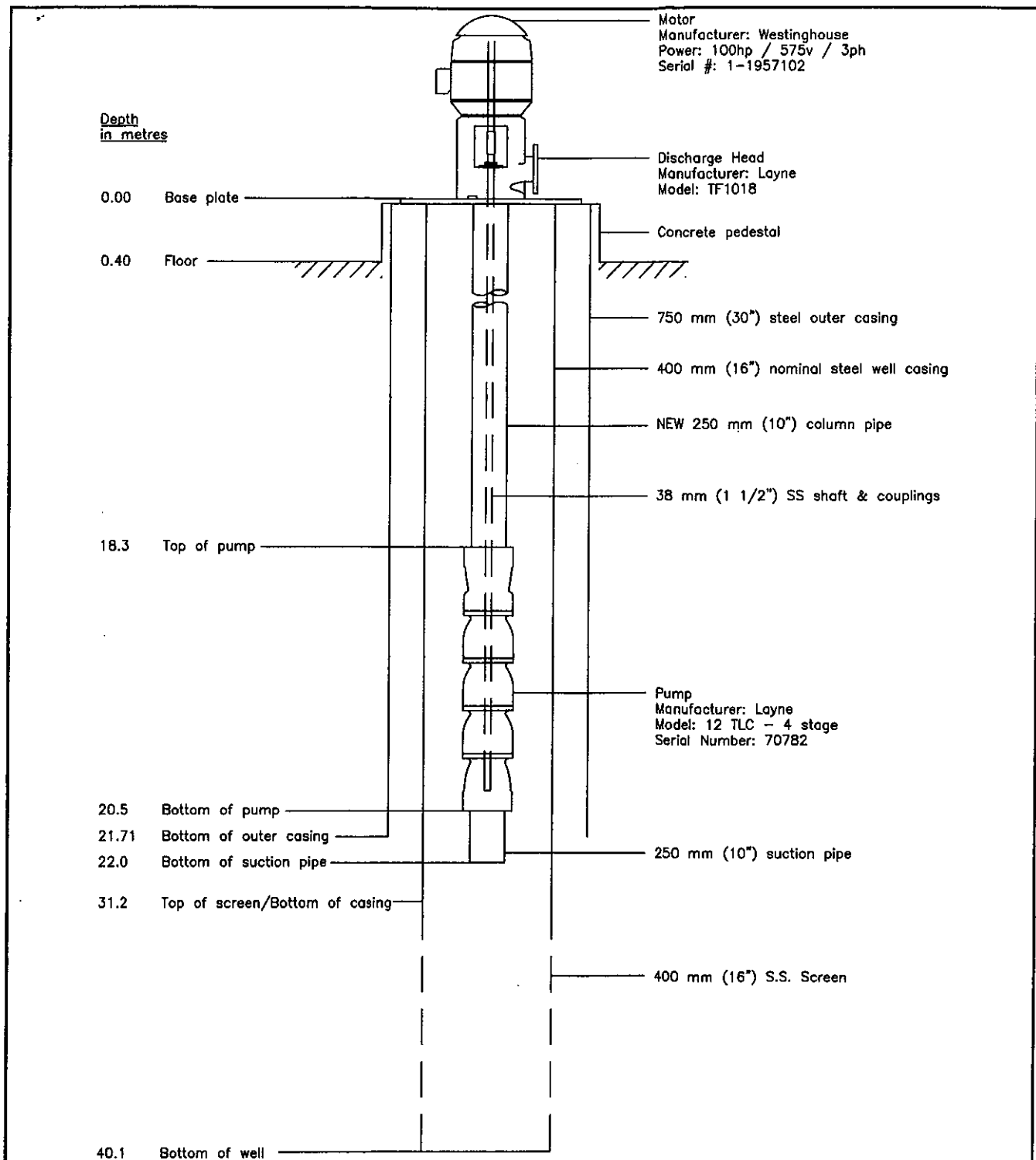
Well No. 50 (WILMOT)B. P. referred to original ground level + 3'Clear depth below B. P. 121'-9"Started April '70 Final Test MAY 3Preliminary Test 1300 Static Level 18.12Final Test 1300 Pumping Level 27Guarantee 1050 1 G P M Capacity 1000 lContract Pressure 3 Pressure Pump 5Length Air Line 110' Main 63

INTERNATIONAL WATER SUPPLY

MONTREAL GARRIE ~~WILMOT~~, CANADA SAS
WATER SUPPLY CONTRACTORS

KITCHENER WATER COMMISSION

DRILLED BY K/LG - AUGUSTINE
INSTALLED BYDRAWN BY L.H.
APPROVED BY



CLIENT

Regional Municipality of Waterloo

TITLE

K50
Pump Installation Drawing

PROJECT No.006-336

G:\Lotowater Projects\006 Region of Waterloo\336 K50\Lineshaft Pump Installation.dwg

FIGURE

DESIGN

DRAWN

CHECKED

EH

2015/06/10

REVISION No.

2015/06/10

SCALE

N.T.S.

3

K51 = 3268

Well Material K51

Outer Casing 52'-3" - 30" DIA STEEL
 Inner Casing 101'-0" - 18" DIA STEEL
 Screen 30'-18" LAYNE SS - 10 FT No. 3 20
 Plug
 Gravel 30T $\frac{3}{8} \times \frac{3}{4}$, 50T $\frac{1}{4} \times \frac{1}{2}$, 22T. P.

Pump

No. 70793 Setting BP-MB 100'-0"
 No. Stages 4 Length Bowl 5'-2"
 Bowl 12" TLL Size & Lgth. Suction 10"
 Head TF1018 Size Column 10" x $\frac{1}{2}$ " SS
 Materials or setting details other than stand
 Impellers: Trim ZINC SLE

Motor

Make WESTING HOUSE Phase 3
 H. P. 100 Cycles 60
 R. P. M. 1775 Volts 575
 Type HSB Amps. 91
 Frame 404TP Serial 2-1957102
 Bearing Nos. 7222 - 631477C3

Special EquipmentWell No. 51 (WILMOT)

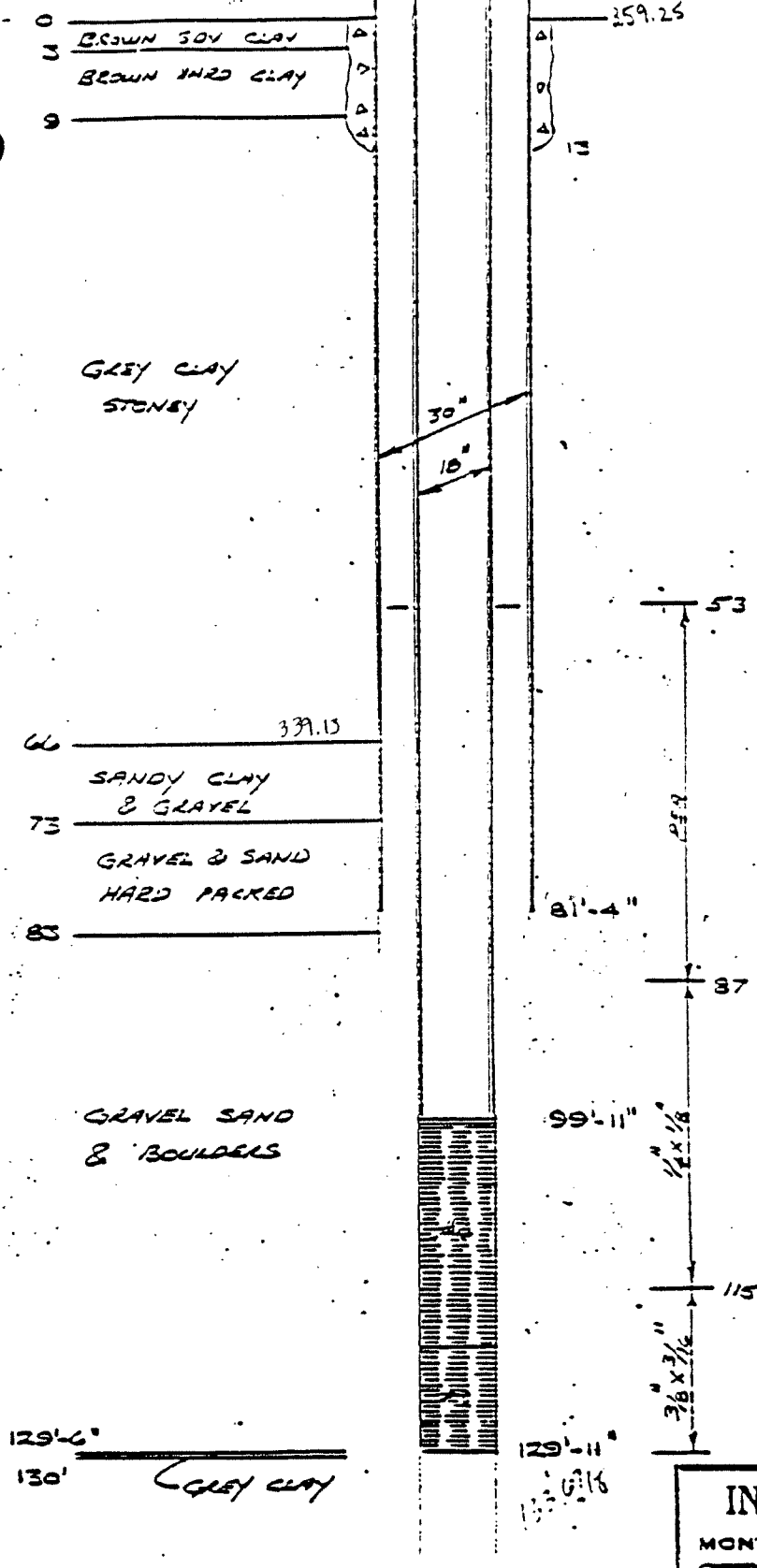
B. P. referred to original ground level +2'-9"
 Clear depth below B. P. 134'-0"
 Started Aug 70 Final Test MAY 23/71
 Preliminary Test Aug 27/70 Static Level 18.06
 Final Test _____ Pumping Level 22.1
 Guarantee 1050 1 GPM Capacity 1030 1 C
 Contract Pressure _____ = Pressure Pump 22
 Length Air Line 110' Main 63

INTERNATIONAL WATER SUPPLY LTD.

MONTREAL 50018 CANADA SASK
 WATER SUPPLY CONTRACTORS

KITCHENER WATER COMMISSION

DRILLED BY T. KYLE DRAWN BY B.L.H.
 INSTALLED BY JOE HARTMAN. APPROVED BY



Depth
in metres

0.00

Base plate

0.33

Floor

18.29

Top of pump/Bottom of Airline

19.79

Bottom of pump

20.57

Bottom of suction pipe

25.20

Bottom of outer casing

31.90

Bottom of inner casing

39.70

Bottom of well

Motor
Manufacturer: Westinghouse
Power: 100hp / 575v / 3ph
Serial #: 2-1957102

Discharge Head
Manufacturer: Layne
Model: T302

Airline guage

Concrete pedestal

750 mm (30") steel outer casing

450 mm (18") nominal steel well casing

NEW

250 mm (10") SCH 40 column pipe

38 mm (1 1/2") SS shaft & couplings

9.5 mm (3/8") Poly airline

Pump
Manufacturer: Weir
Model: 12 JKH - 4 stage

200 mm (8") suction pipe

450 mm (18") S.S. Screen

G:\Miscellaneous\Alfredo\Lototech.JPG

CLIENT

Regional Municipality of Waterloo

TITLE

**K51
Pump Installation Drawing**

PROJECT No. **006-257**

G:\Lotowater Projects\006 Region of Waterloo\257 K51 Testing\Lineshaft Pump Installation.dwg

DESIGN

DRAWN

EH

2011/01/03

REVISION No. 2013/01/15

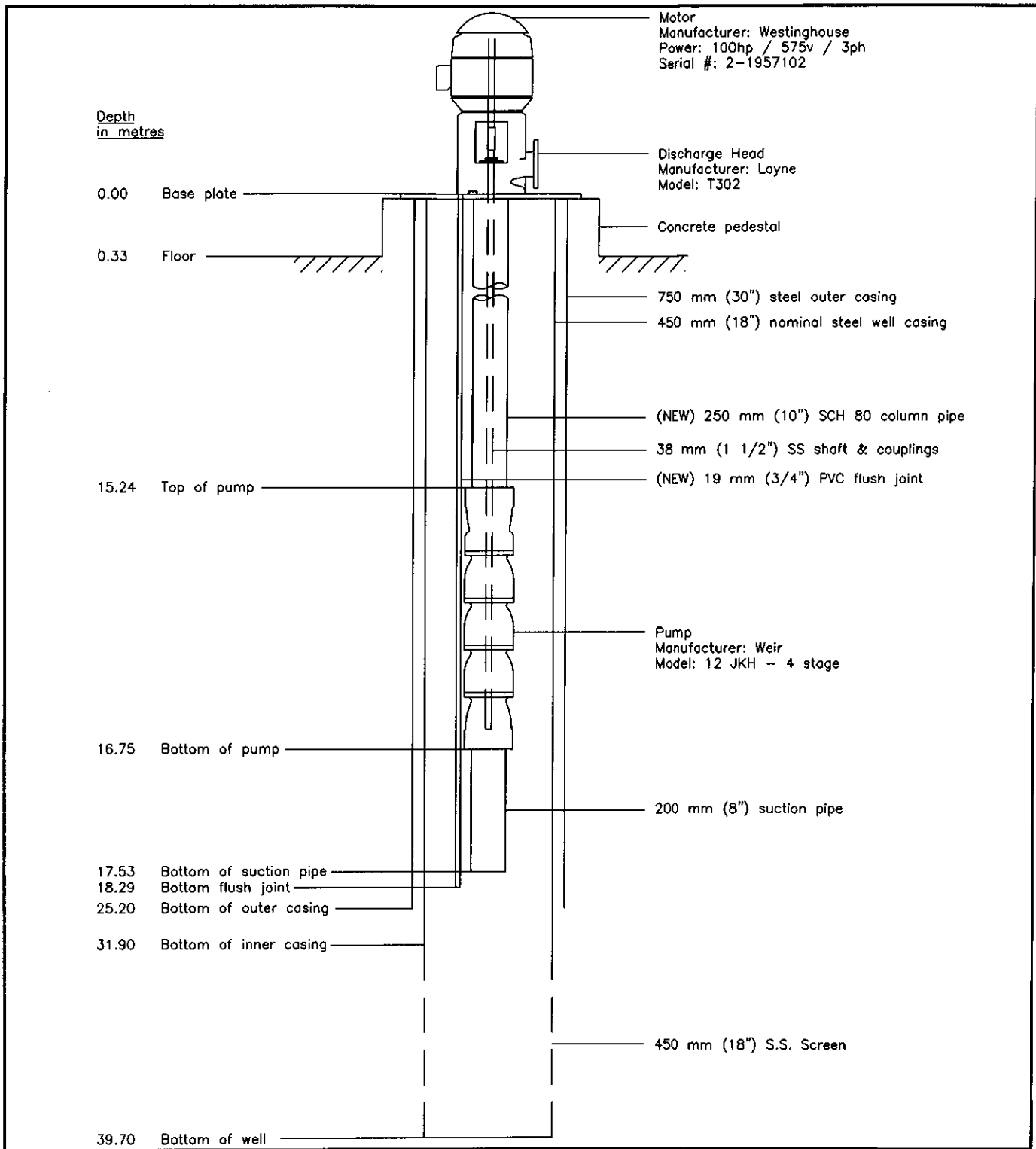
SCALE

N.T.S.

CHECKED

FIGURE

2



 **Lotowater**
 TECHNICAL SERVICES INC.

CLIENT

Regional Municipality of Waterloo

TITLE

K51
Pump Installation Drawing

PROJECT No. 006-374

G:\Lotowater Projects\006 Region of Waterloo\374 K51\Lineshaft Pump Installation.dwg

DESIGN

DRAWN

CHECKED

EH

2011/01/03

REVISION No.

2016/08/11

SCALE

N.T.S.

FIGURE

1

STANTEC BOREHOLE AND WELL - MASTER TX11 - 160900734 - MASTER LOGS.GPJ - STANTEC - DATA TEMPLATE.GDT 7/17/14 NSPINA

Test Production Well: WT-WC-TW1-13

Project: 2013 Well Construction and Testing
Client: Regional Municipality of Waterloo
Location:Region of Waterloo; Wilmot Centre Well Field
Number: 1609-00734

Field Investigator: E. Hayman
Contractor: Gerrits Well Drilling Inc.
Drilling method: DR24, truckmount, air rotary
Date started/completed:01-May-2013 / 04-Jun-2013

K52

SUBSURFACE PROFILE				HYDROGEOLOGY		SAMPLE DETAILS		GEOPHYSIC DETAILS	WELL DETAILS
Depth	Graphic Log	Lithologic Description	Elevation (m AMSL) Depth (m BGS)	Hydro Stratigraphic Unit	Description	Sample Number	Sample Type	Gamma (cps)	Name: WT-WC-TW1-13 Location: 9207058 GS Elev: 359.17 m AMSL TOC Elev: 359.48 m AMSL Easting: 530865.21 Northing: 4803953.24 Stick-up: 0.68 m
(ft) (m)								20 40 60 80	
		Ground Surface	359.17						
		TOPSOIL	0.00						
5	2	silt, fine to medium grained sand, little gravel, trace clay, dark reddish brown (3/2 7.5 YR), moist	357.65			1	GB		
10	4	SILTY SAND	1.52			2	GB		
15		fine and medium grained sand, trace fine gravel, trace clay, brown 5/3 7.5 YR				3	GB		
20	6		353.07			4	GB		
25	8	CLAY	6.10			5	GB		
30		some silt, trace fine gravel, brown (4/2 7.5 YR)				6	GB		
35	10	SILTY SAND	9.14			7	GB		
40	12	medium grained sand, trace clay, brown (4/3 7.5 YR)				8	GB		
45	14		345.45			9	GB		
50	16	SILT CLAY TILL	13.72			10	GB		
55		trace sand, trace fine gravel, brownish gray (6/3 7.5 YR)				11	GB		
60	18	increasing fine gravel from 16.76 m BGS to 18.29 m BGS	340.88			12	GB		
65	20	SILTY SAND	18.29			13	GB		
70	22	fine and medium grained sand, trace clay, grayish brown (5/2 10 YR), wet	339.36			14	GB		
75		SAND	19.81			15	GB		
80	24	fine and medium grained sand, little silt, trace clay, grayish brown (5/2 10 YR), wet				16	GB		
85	26		336.31			17	GB		
90	28	SAND and GRAVEL	22.86			18	GB		
95		medium to coarse grained sand, fine to coarse gravel, wet				19	GB		
100	30	little cobbles from 24.38 to 28.89 m BGS				20	GB		
105	32					21	GB		
110	34	some cobbles from 28.89 to 38.10 m BGS				22	GB		
115	36					23	GB		
120		increased gravel content at 35.0 to 36.5 m BGS				24	GB		
125	38		321.07			25	GB		
130	40	SAND	38.10			26	GB		
135		medium to coarse grained sand, some fine gravel, trace coarse gravel, wet				27	GB		
140	42	CLAY TILL	41.45			28	GB		
145	44	little fine gravel, gray	316.50						
		End of Borehole	42.67						

Notes:
m AMSL - metres above mean sea level
m BGS - metres below ground surface
m BTOC - metres below top of casing
GB - grab sample

n/a - not available/applicable

Geophysics completed on May 3, 2013.
WRAS Object Number: 9207058



Drawn By/Checked By: EH, AD / RBC, LV

Sheet 1 of 1

WT-WC-OW1-00

Peto MacCallum Ltd.
CONSULTING ENGINEERS

IN Water Quality Monitoring program
- Originally thought this was obj# 6505713 → incorrectly assigned. Assigned new obj# Jan. 19 2011

obj# 920577

LOG OF BOREHOLE NO 101

PROJECT GROUNDWATER SAMPLING AND ANALYSES

LOCATION Waterloo Region K50/51 Well Site, Blean's Road, Kitchener BORING DATE 2000 08 29

BORING METHOD Continuous Flight Solid Stem Augers

OUR PROJECT NO 99 KX 10A

ENGINEER P. Mann

TECHNICIAN P.E.

SOIL PROFILE			SAMPLES			SHEAR STRENGTH C_u				HEADSPACE READINGS (1)		GROUND WATER OBSERVATIONS AND REMARKS
DEPTH IN METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N-VALUES	DYNAMIC CONE PENETRATION STANDARD PENETRATION TEST				(ppm)	
	GROUND ELEVATION						BLOWS/0.3m					
							20	40	60	80		
	FILL: Compact mottled brown mixture of silty sand and clayey silt, some gravel, no odour, moist			1	SS	16					0	On August 29, 2000, the water level was measured at a depth of 1.86 m, and the RKI Eagle Reading was 35 ppm.
1.80												
	CLAYEY SILT TILL: Stiff mottled brown clayey silt, trace sand, rootlets, weathered, A.P.L.			2	SS	9					0	
2.60				3	SS	19					0	
	becoming very stiff light brown clayey silt, trace fine sand and gravel, oxidized, A.P.L.			4	SS	29					0	
3.45				5	SS	26					5	
	becoming grey											
4.25												
	SILTY SAND: Compact grey silty sand, occasional clay and silt seams, saturated											
5.35												
	BOREHOLE TERMINATED AT 5.35 m											

Reports filed
in:
E06-20-01/W1

- NOTES (1) Organic Vapour Concentrations were measured on the headspace of soil samples using an RKI Eagle Instrument calibrated to hexane.
(2) The borehole was unsampled between 4.40 and 5.35 m depth, in order to facilitate installation of the observation well.

CHECKED BY Rn

Print only in spaces provided.

Mark correct box with a checkmark, where applicable.

11

6508600

Municipality

Con

65004

BR N

County or District Waterloo	Township/Borough/City/Town/Village Wilmot twp.	Con block tract survey, etc. BRN	Lot 11
Owner's surname Regional Mun. of Waterloo	First Name 	Address 150 Frederick St. 4th Floor, Kitchener	Date completed 26 Nov 99 day month year

[illegible]

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet	
				From	To
Brown	Sand	Silt		0	11
Brown	Silty sand			11	19
Grey	Silty clay			19	40
Grey	Clay		Soft	40	59
Brown	Clay		Soft, fine	59	73
Brown	Sand		Soft, med.	73	99
Grey	Clay layers		Soft	99	104
Grey	Sand	Clay layers	Soft	104	109
Brown	Sand		Coars e	109	147
Brown	Gravel		Hard	147	154
Grey y	Clay		Hard	154	156

[illegible]

WATER RECORD					
Water found at - feet	Kind of water				
10-13	1 ☒ Fresh 2 ☐ Salty	3 ☐ 4 ☐ 5 ☐ 6 ☐	Sulphur Minerals Gas	4	
15-18	1 ☐ Fresh 2 ☐ Salty	3 ☐ 4 ☐ 5 ☐ 6 ☐	Sulphur Minerals Gas	19	
20-23	1 ☐ Fresh 2 ☐ Salty	3 ☐ 4 ☐ 5 ☐ 6 ☐	Sulphur Minerals Gas	24	
25-28	1 ☐ Fresh 2 ☐ Salty	3 ☐ 4 ☐ 5 ☐ 6 ☐	Sulphur Minerals Gas	29	
30-33	1 ☐ Fresh 2 ☐ Salty	3 ☐ 4 ☐ 5 ☐ 6 ☐	Sulphur Minerals Gas	34	6

51. CASING & OPEN HOLE RECORD					
Inside diam inches	Material	Wall thickness inches	Depth - feet		
			From	To	
10-11	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☒ Plastic	12	Sch. 40	+3	134
2	17-18	19			
1 1/4	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☒ Plastic	20-23	Sch. 40	+3	83
24-25	26	27-30			
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic				

SCREEN	Sizes of opening (Slot No.)	31-33	Diameter	34-38	Length	39-40
	# 10		2 1/4	inches	20	feet
	Material and type			Depth at top of screen	41-44	
	Plastic			134	feet	

61 PLUGGING & SEALING RECORD			
☐ Annular space		☐ Abandonment	
Depth set at - feet		Material and type (Cement grout, bentonite, etc.)	
From	To		
10-13	14-17		
18-21	22-25		
26-29	30-33		
		80	

71	Pumping test method ¹⁰		Pumping rate ¹¹⁻¹⁴		Duration of pumping ¹⁵⁻¹⁶	
	1 ☐ Pump	2 ☐ Bailer	GPM		Hours ¹⁷⁻¹⁸	Mins
	Static level	Water level end of pumping	Water levels during		1 ☐ Pumping	2 ☐ Recovery
	¹⁹⁻²¹	²²⁻²⁴	15 minutes ²⁵⁻²⁸	30 minutes ²⁹⁻³¹	45 minutes ³²⁻³⁴	60 minutes ³⁵⁻³⁷
	feet	feet	feet	feet	feet	feet
	If flowing give rate ³⁸⁻⁴¹	GPM	Pump intake set at	feet	Water at end of test ⁴²	
Recommended pump type		Recommended pump setting ⁴³⁻⁴⁵		Recommended pump rate ⁴⁶⁻⁴⁹		
1 Shallow ☐ Deep		feet		GPM		

FINAL STATUS OF WELL			5-4
1 ☐ Water supply	5 ☐ Abandoned, insufficient supply	9 ☐ Unfinished	
2 ☒ Observation well	6 ☐ Abandoned, poor quality	10 ☐ Replacement well	
3 ☐ Test hole	7 ☐ Abandoned (Other)		
4 ☐ Recharge well	8 ☐ Dewatering		

WATER USE			55-56
1 ☐ Domestic	5 ☐ Commercial	9 ☐ Not use	
2 ☐ Stock	6 ☐ Municipal	10 ☐ Other	
3 ☐ Irrigation	7 ☐ Public supply		
4 ☐ Industrial	8 ☐ Cooling & air conditioning		

METHOD OF CONSTRUCTION			57
1 ☐ Cable tool	5 ☐ Air percussion	9 ☐ Driving	
2 ☒ Rotary (conventional)	6 ☐ Boring	10 ☐ Digging	
3 ☐ Rotary (reverse)	7 ☐ Diamond	11 ☐ Other	
4 ☐ Rotary (air)	8 ☐ Jetting		

LOCATION OF WELL

In diagram below show distances of well from road and lot line.
Indicate north by arrow.

K5 Wells

X WELL ON FENCE LINE

BEAMS RD.

213799

Name of Well Contractor	Well Contractor's Licence No.
Davidson Well Drilling Limited	1737
Address	
Box 486, Wingham, Ontario NOG 2W0	
Name of Well Technician	Well Technician's Licence No.
K. Lang	T0446
Signature of Technician/Contractor	Submission date
D.W. Davidson	30 Nov 99

MINISTRY USE ONLY	Data source	58 Contractor	59-62	Date received	63-65
	1737		FEB 15 2000		
	Date of inspection		Inspector		
	Remarks				
	CSS.ES0				



171 Victoria St. N,
Kitchener, ON, N2H 4K3
(519) 742 6685

Borehole/Well ID: WT-WC-MW4A-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth	Symbol	Description	Elevation	Number	Type	Recovery	
0		Ground Surface	0.00				
2		Silt Reddish-brown with fine sand, some clay with organics, trace gravel, soft, moist		Run 1		100%	
4			-1.37				
6		Black, clay, fine sand, organics, soft, moist		Run 2			
8		Black, some clay, fine sand, with organics, trace gravel, soft, moist to dry	-2.26				
10		Sand Medium brown, fine, well sorted, soft, moist	-3.35	Run 3			
12							
14		Clay Light brown, black and orange staining, trace gravel, stiff	-4.67	Run 4		100%	
16		Light brown, boulder fragments					
18		Brown to grey, trace gravel and fine sand					
20		Grey, sandy, wet	-6.20				
22		Silty Clay Brownish-grey, silty, trace gravel		Run 5		90%	
24			-7.72				
26				Run 6		90%	
28			-8.59				
30		Sand Light brown, fine, well sorted, soft, wet to moist					
32							
34							

Drilled By: Aardvark Drilling Inc.

Template: WESA QMS Kitchener, MW No sample

Drill Method: PQ

Hole Size (m): 0.2

Datum:

Drill Date: March 2, 2011

Supervised By: GM

Sheet: 1 of 4



WESA

A Better Environment For Business

171 Victoria St. N,
Kitchener, ON, N2H 4K3
(519) 742 6685

Borehole/Well ID: WT-WC-MW4A-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details	
Depth	Symbol	Description	Elevation	Number	Type	Recovery		
37		Clay Light brown, stiff, trace subangular gravel, trace silt, alternating soft clay and hard silt layers, moist	-11.07	Run 7		30%		
39								
41								
43				Run 8		60%		
45								
47				Run 9		25%		
49								
51								
53								
55								
57				Run 10		60%		
59			-18.39					
61		Silty Sand Light brown, silty, fine sand, well sorted, soft, wet		Run 11		75%		
63								
65		Clayey Sand Light brown, clayey, soft, wet Medium brown, medium, soft, wet	-19.91	Run 12				
67								
69						100%		

Drilled By: Aardvark Drilling Inc.

Template: WESA QMS Kitchener, MW No sample

Drill Method: PQ

Hole Size (m): 0.2

Datum:

Drill Date: March 2, 2011

Supervised By: GM

Sheet: 2 of 4

Borehole/Well ID: WT-WC-MW4A-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details	
Depth	Symbol	Description	Elevation	Number	Type	Recovery		
72			-22.15	Run 13		95%		
74		Silty Sandy Clay Greyish brown, silty, clay with angular gravel, stiff, moist						
76	23	Cobbles Subrounded some loose coarse sand	-23.16	Run 14		100%		
78		Subrounded, loose, cobbly boulders with some coarse sand	-23.47					
80		Subrounded boulders, 5-15cm	-24.38					
82	25	Sandy Gravelly Clay Greyish-brown, gravelly, coarse sand, subangular, firm, wet to moist,		Run 15		75%		
84		Cobbles Subangular, 3-5cm, some boulders, loose		Run 16		85%		
86								
88	27			Run 17		70%		
90								
92								
94	29			Run 18		80%		
96								
98								
100								
102	31			Run 19		50%		
104								

Drilled By: Aardvark Drilling Inc.

Drill Method: PQ

Drill Date: March 2, 2011

Template: WESA QMS Kitchener, MW No sample

Hole Size (m): 0.2

Supervised By: GM

Datum:

Sheet: 3 of 4

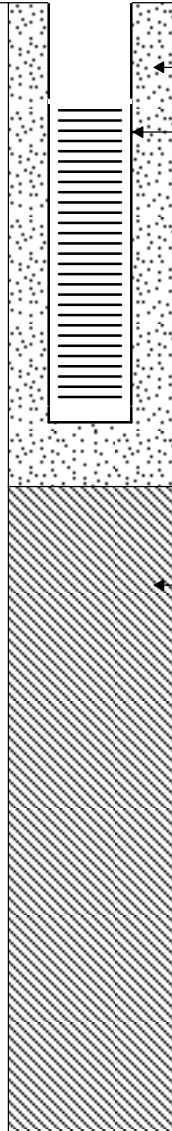
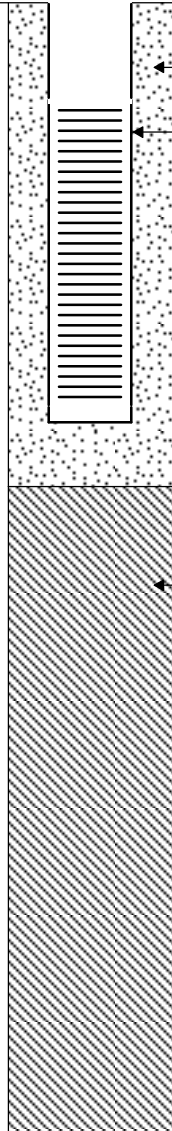
Borehole/Well ID: WT-WC-MW4A-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth	Symbol	Description	Elevation	Number	Type	Recovery	
107				Run 20		65%	 #2 Sand #10 Slot Screen Bentonite
109							
111				Run 21		100%	
113							
115		Smaller, some gravel	-35.05				
117				Run 22		80%	
119			-36.58				
121		Some silty clay chips					
123				Run 23		50%	 Bentonite
125			-38.10				
127		Some silt and clay with coarse sand		Run 24		50%	
129			-39.62				
131		Boulders, some clay/silt, subangular, up to 12cm, loose	-40.23	Run 25		80%	
133		Cobbles with coarse gravel, subrounded to rounded, loose	-41.15				
135							
137		Clay Silty clay till with cobbles, subrounded to subangular, trace medium sand, very hard, moist		Run 26		65%	
139			-42.67				

Drilled By: Aardvark Drilling Inc.

Template: WESA QMS Kitchener, MW No sample

Drill Method: PQ

Hole Size (m): 0.2

Datum:

Drill Date: March 2, 2011

Supervised By: GM

Sheet: 4 of 4



WESA

A Better Environment For Business

171 Victoria St. N,
Kitchener, ON, N2H 4K3
(519) 742 6685

Borehole/Well ID: WT-WC-MW4B-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth	Symbol	Description	Elevation	Number	Type	Recovery	
0		Ground Surface	0.00				
2		Silt Medium brown, silty, sandy fill, some clay					
4			-1.52				
6							
8							
10							
12			-3.66				
14		Clay Silt, sticky, soft, wet					
16							
18							
20							
22							
24							
26							
28							
30							
32							
34							
36							
38							
40							
42							
44							

Drilled By: Aardvark Drilling Inc.

Template: WESA QMS Kitchener, MW No sample

Drill Method: Mud Rotary

Hole Size (m): 0.15

Datum:

Drill Date: March 3, 2011

Supervised By: GM

Sheet: 1 of 3



WESA

A Better Environment For Business

171 Victoria St. N,
Kitchener, ON, N2H 4K3
(519) 742 6685

Borehole/Well ID: WT-WC-MW4B-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details		
Depth	Symbol	Description	Elevation	Number	Type	Recovery			
47		Some coarse sand	-15.24						
49								15	
51									
53									
55									
57		Gravel Hard, boulders, rock chips	-19.81						
59									
61									
63									
65									
67									
69									
71									
73									
75									
77									
79									
81									
83									
85									
87									
89								27	

Drilled By: Aardvark Drilling Inc.

Template: WESA QMS Kitchener, MW No sample

Drill Method: Mud Rotary

Hole Size (m): 0.15

Datum:

Drill Date: March 3, 2011

Supervised By: GM

Sheet: 2 of 3



WESA

A Better Environment For Business

171 Victoria St. N,
Kitchener, ON, N2H 4K3
(519) 742 6685

Borehole/Well ID: WT-WC-MW4B-11

Project No.: W-B8791

Client: Region of Waterloo

Location: Wilmot Twp.

Project Manager: Tiffany Svensson

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth	Symbol	Description	Elevation	Number	Type	Recovery	
92			-28.96				 Pellet Plug
94							
96		End of Borehole					
98							
100							
102	31						
104							
106							
108	33						
110							
112							
114	35						
116							
118							
120							
122	37						
124							
126							
128	39						
130							
132							
134	41						

Drilled By: Aardvark Drilling Inc.

Template: WESA QMS Kitchener, MW No sample

Drill Method: Mud Rotary

Hole Size (m): 0.15

Datum:

Drill Date: March 3, 2011

Supervised By: GM

Sheet: 3 of 3



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Appendix C

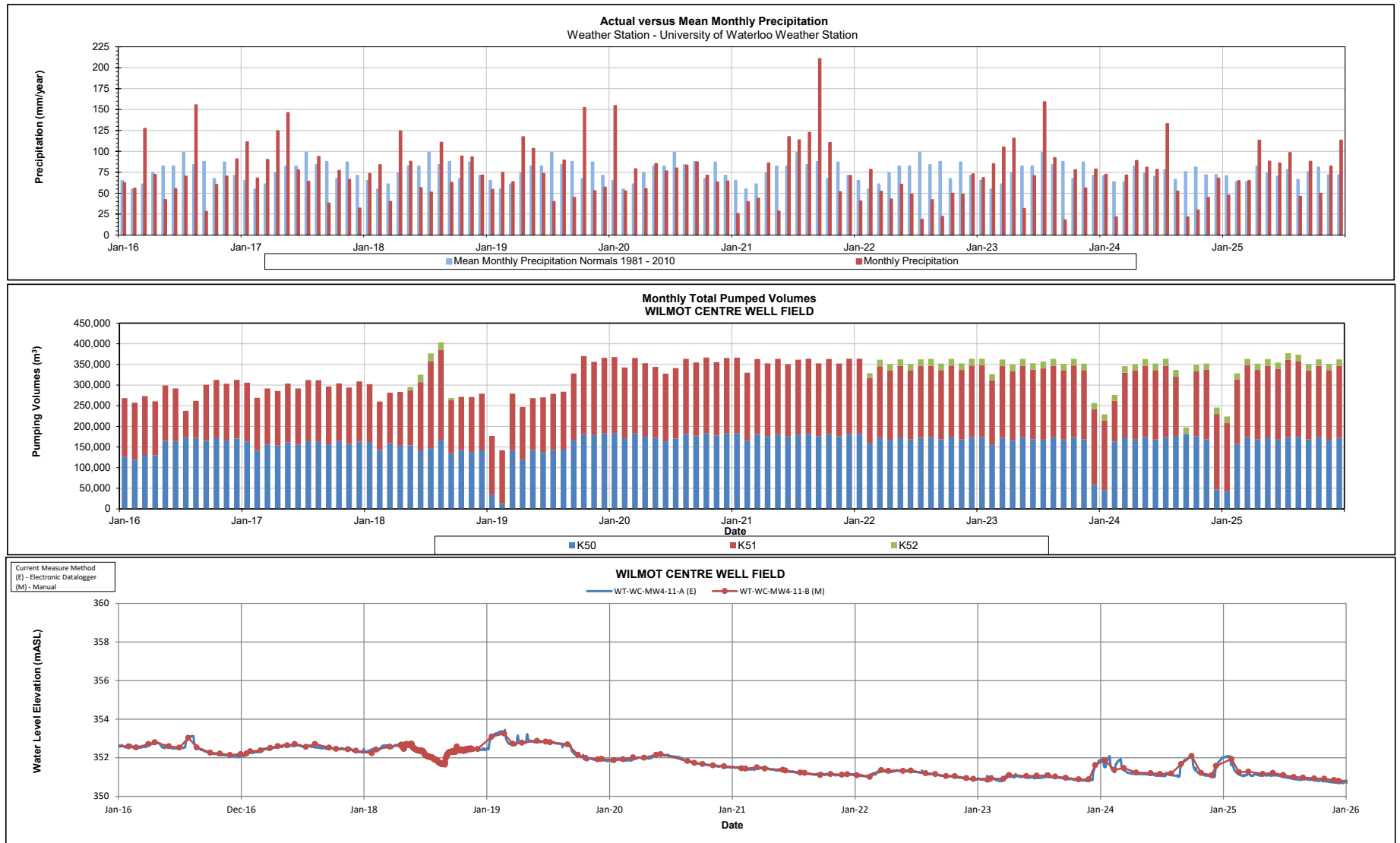
Monitoring Data (Pumped Volumes and Hydrographs)

TABLE C-1
WELL FIELD WATER PRODUCTION SUMMARY
REGION OF WATERLOO - 2025 GROUNDWATER MONITORING REPORT

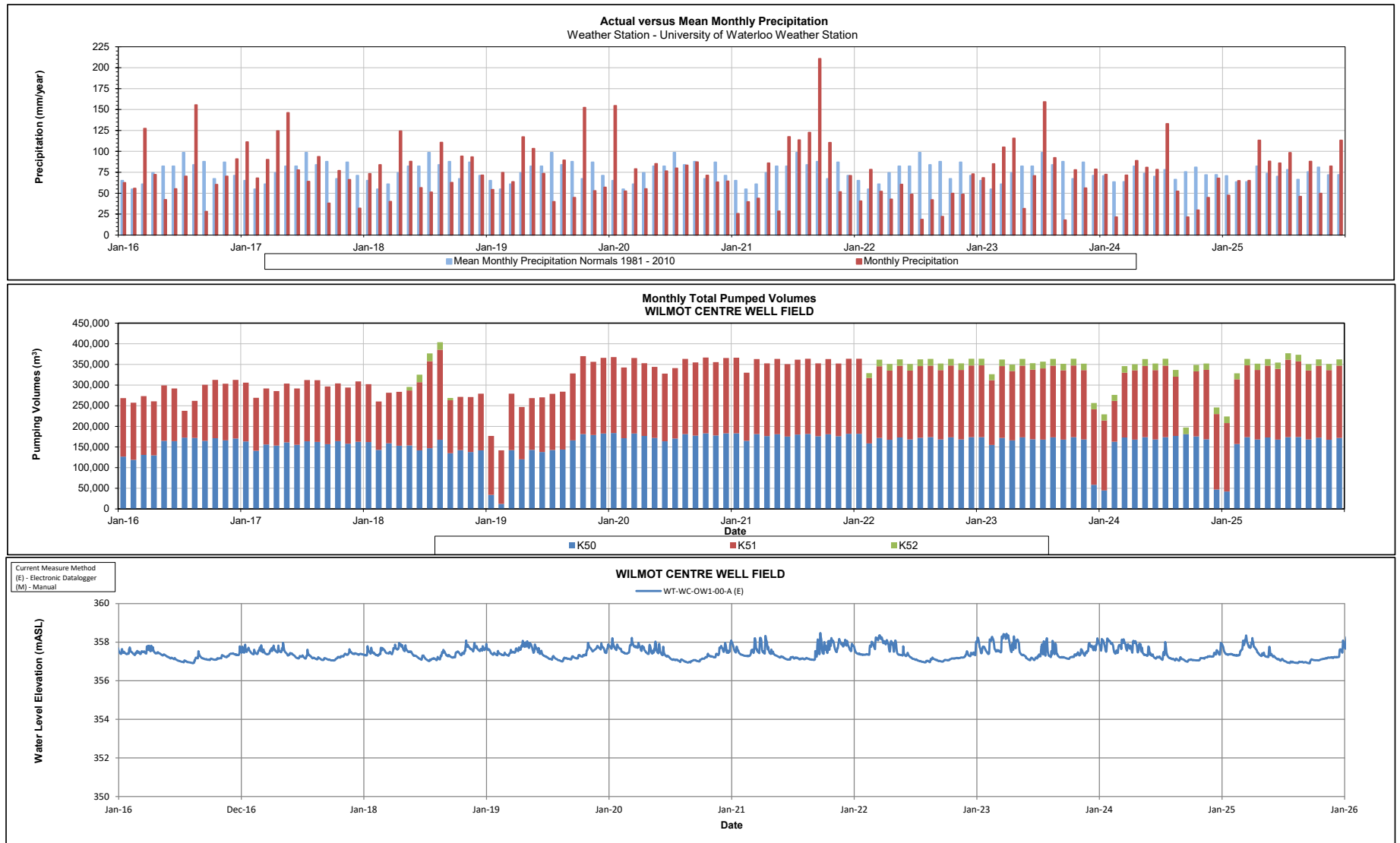
Well Field	Major or Minor Supply	Production Well Name	Status	Permit to Take Water Details			2021 Production Summary			2022 Production Summary			2023 Production Summary			2024 Production Summary			2025 Production Summary		
				MOE Permit Number	Permitted Capacity (total m ³ /year)*	Permitted Rate (L/s)*	Total Production Well Volume (total m3/year)	Average Daily Rate (m3/day)	Average Rate (L/s)	Total Production Well Volume (total m3/year)	Average Daily Rate (m3/day)	Average Rate (L/s)	Total Production Well Volume (total m3/year)	Average Daily Rate (m3/day)	Average Rate (L/s)	Total Production Well Volume (total m3/year)	Average Daily Rate (m3/day)	Average Rate (L/s)	Total Production Well Volume (total m3/year)	Average Daily Rate (m3/day)	Average Rate (L/s)
Wilmot Centre	Major	K50 K51 K52	Supply Supply Connected in 2018	4874-9SGL5L	Combined rate for PTTW 4,977,870	4874-9SGL5L	2,139,857	5,863	67.9	2,051,921	5,622	65.1	1,919,702	5,259	60.9	1,813,989	4,970	57.5	1,911,549	5,237	60.6
				4874-9SGL5L		2,143,040	5,871	68.0	2,052,100	5,622	65.1	2,052,063	5,622	65.1	1,759,310	4,820	55.8	2,065,448	5,659	65.5	
				4874-9SGL5L		0	0	0	171,512	470	5	189,928	520	6	187,843	515	6.0	184,931	507	5.9	
				Well Field Total	4,977,870	159.1	4,282,897	11,734	135.8	4,275,533	11,714	135.6	4,161,693	11,402	132.0	3,761,142	10,304	119.3	4,161,928	11,403	132.0

Notes:
- = no applicable data
n/a = data not available
* = rates and volumes based on permitted L/day

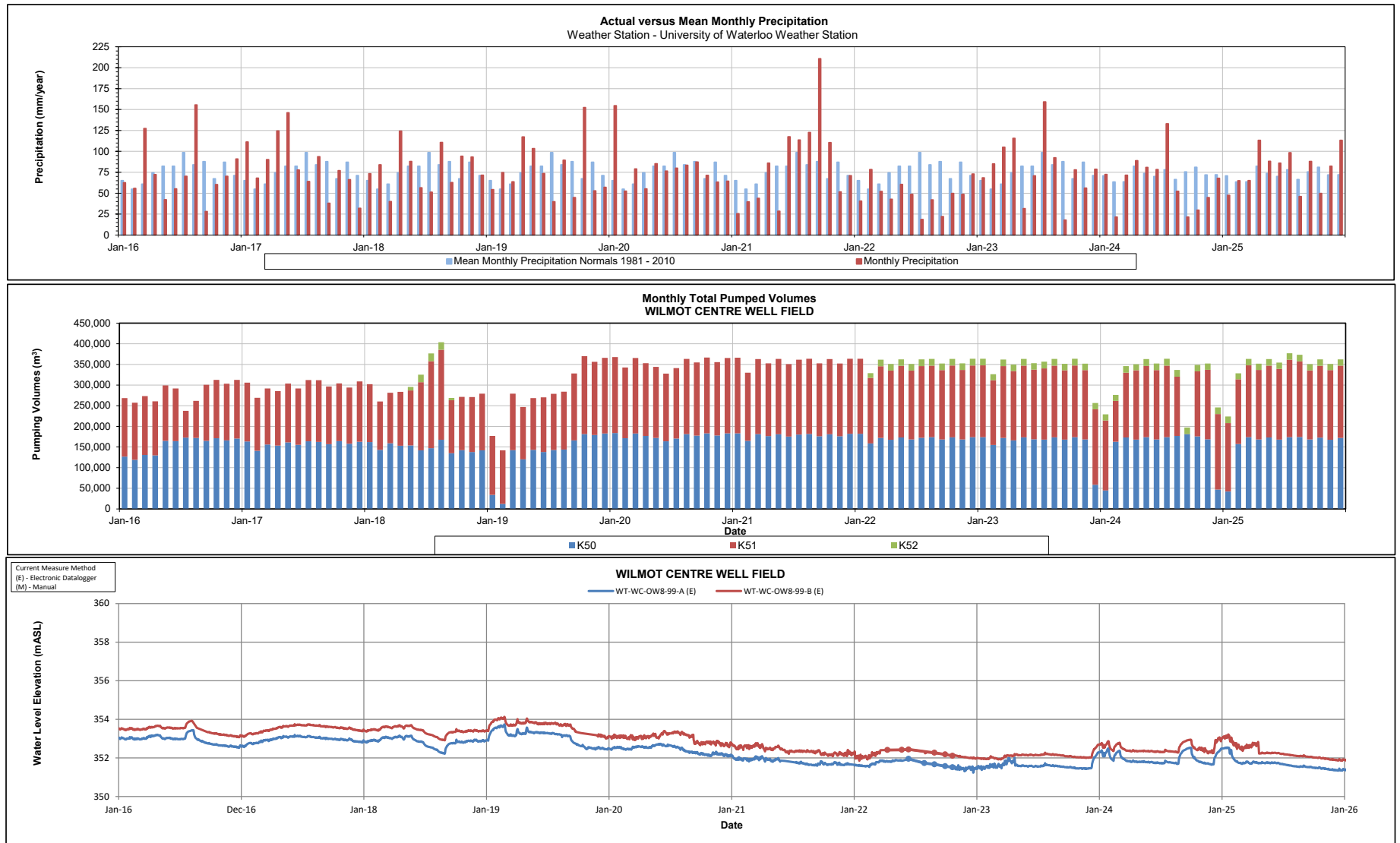
REGION OF WATERLOO
2025 GROUNDWATER MONITORING REPORT -
WILMOT CENTRE



REGION OF WATERLOO
2025 GROUNDWATER MONITORING REPORT -
WILMOT CENTRE



REGION OF WATERLOO
2025 GROUNDWATER MONITORING REPORT -
WILMOT CENTRE





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Appendix D

Precipitation Data

Table D-1
Precipitation Variation from Average
Region of Waterloo - 2025 Groundwater Monitoring Report

Year	Kitchener/Waterloo Weather Station Established 1966		
	Annual Precipitation (mm)	30-yr NORMAL Precipitation 1981-2010 (mm)	Difference (mm)
2016	748	851	-103
2017	818	851	-33
2018	749	851	-102
2019	695	851	-156
2020	689	851	-162
2021	772	851	-79
2022	438	851	-413
2023	813	851	-38
2024	874	851	23
2025	723	851	-128

Year	University of Waterloo Station Established 1988		
	Annual Precipitation (mm)	Average Precipitation 1998-2024 (mm)	Difference (mm)
2016	891	871	20
2017	989	871	118
2018	950	871	79
2019	923	871	52
2020	953	871	82
2021	1022	871	151
2022	578	871	-293
2023	959	871	88
2024	763	871	-108
2025	943	871	72

Year	Shand Dam Established 1939		
	Annual Precipitation (mm)	Average Precipitation 1940-2025 (mm)	Difference (mm)
2016	976	926	50
2017	1093	926	167
2018	849	926	-77
2019	1081	926	155
2020	1017	926	91
2021	876	926	-50
2022	798	926	-128
2023	1015	926	89
2024	994	926	68
2025	995	926	69

Year	Conestogo Dam Established 1961		
	Annual Precipitation (mm)	Average Precipitation 1961-2025 (mm)	Difference (mm)
2016	983	990	-7
2017	1210	990	220
2018	962	990	-28
2019	992	990	2
2020	1021	990	31
2021	975	990	-15
2022	907	990	-83
2023	1053	990	63
2024	972	990	-18
2025	1025	990	35

Year	Woolwich Dam Established 1960		
	Annual Precipitation (mm)	Average Precipitation 1960-2025 (mm)	Difference (mm)
2016	844	835	9
2017	986	835	151
2018	869	835	34
2019	824	835	-11
2020	862	835	27
2021	649	835	-186
2022	668	835	-167
2023	859	835	24
2024	793	835	-42
2025	732	835	-103

Year	Shade's Mills Dam Established 1960		
	Annual Precipitation (mm)	Average Precipitation 1960-2025 (mm)	Difference (mm)
2016	934	909	24
2017	1092	909	183
2018	1042	909	133
2019	1059	909	150
2020	848	909	-62
2021	1020	909	111
2022	682	909	-227
2023	982	909	73
2024	976	909	67
2025	895	909	-14

Year	Laurel Dam Established 1960		
	Annual Precipitation (mm)	Average Precipitation 1960-2025 (mm)	Difference (mm)
2016	985	938	47
2017	1062	938	124
2018	1071	938	133
2019	940	938	2
2020	938	938	0
2021	1027	938	89
2022	689	938	-249
2023	921	938	-17
2024	907	938	-31
2025	894	938	-44

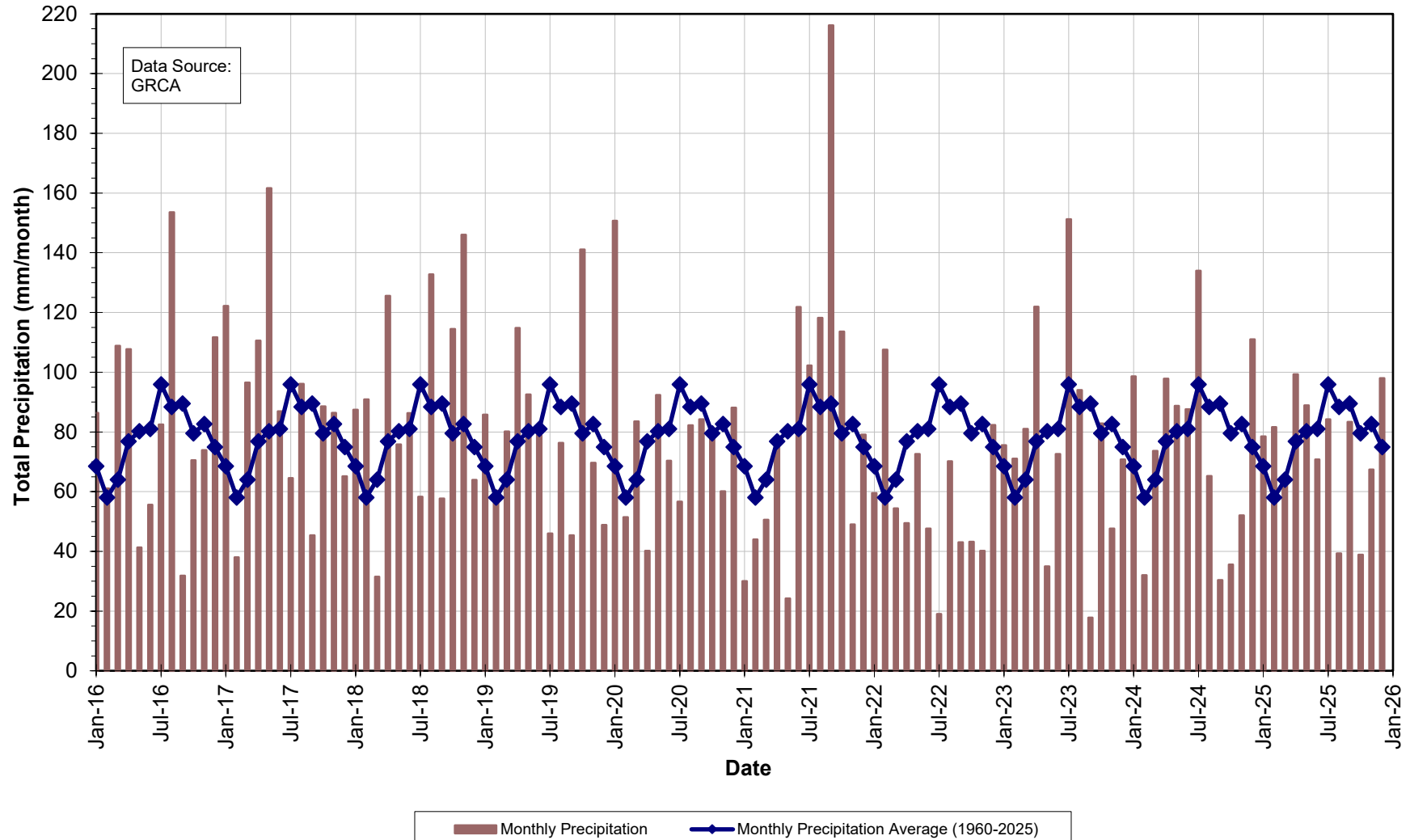
Year	Roseville Weather Station Established 1972		
	Annual Precipitation (mm)	30-yr NORMAL Precipitation 1981-2010 (mm)	Difference (mm)
2016	899	919	-20
2017	882	919	-37
2018	905	919	-14
2019	957	919	38
2020	817	919	-102
2021	832	919	-87
2022	637	919	-282
2023	945	919	26
2024	856	919	-63
2025	786	919	-133

NOTES:

WIA station data is not subject to review by the National Climate Archives, therefore, undergoes very limited quality checking.
 GRCA Dam stations data is not reviewed extensively and undergoes limited quality checking.

Region of Waterloo – 2025 Groundwater Monitoring Report

Figure D.1
Laurel Creek Dam
Monthly Precipitation





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Appendix E

Monitoring Program Overview

GROUNDWATER LEVEL MONITORING PROGRAM PROCEDURES

E.1 Overview

The Region of Waterloo (Region) collects water level measurements at specific monitoring wells to ensure sustainable long-term water supply and to meet monitoring and reporting requirements for the Region's water-taking permits. The goal of the program is to manage and protect the Region's groundwater supply and to assess the potential impact of municipal pumping on the groundwater and surface water resources in the Region. The ongoing collection and assessment of groundwater level data is integral to assess any changes to the water resources that may occur due to pumping.

E.1.1 Production Well Pumping and Water Levels

In 2023 the Region managed approximately 132 production wells with status defined as:

- Commissioned – Active wells
- New Not-Commissioned – Well are inactive or locked out until future demand or repairs/maintenance of other wells requires activating them

The well fields are referred to as Urban (Kitchener, Waterloo, and Cambridge) and Rural (North Dumfries, Woolwich, Wilmot, and Wellesley). Well fields in Kitchener, Waterloo, and Cambridge are referred to as the Integrated Urban System (IUS).

The Region's active production wells are monitored through the Region's SCADA (Supervisory Control and Data Acquisition) system, which reads and records the volume pumped on a daily basis. A few wells do not have their own meter but are combined with other nearby well(s) in the well field and the combined flow is divided into a record for each source. Water level measurements are obtained from the production wells where required. All manual measurements are obtained using either an air line or a water level tape.

E.1.2 Monitoring Wells and Surface Water levels

Water levels are measured at monitoring wells and at some surface water features. The objective of this monitoring is to collect data to ensure that the Region's water taking has minimal impact on the environment and on private water takers.

Water levels in the Region's monitoring wells are measured either electronically or manually. Most of the wells that are monitored electronically use datalogger equipment manufactured by *In-Situ Inc.*® LevelTROLLs® and RuggedTROLLs®, as well as, by *Van Essen Instruments (formerly Schlumberger Water Services)* Mini-Divers®, Micro-Divers®, and TD-Divers®; or by *Solinst*® Levelloggers®. The datalogger pressure sensor models used may be either vented (gauged) or non-vented (absolute) for *In-Situ Inc.*®; whereas, for *Van Essen Instruments* and for *Solinst*®, non-vented (absolute) models are used. Barometric dataloggers by each manufacturer suspended in select well locations are also used with the non-vented (absolute) models to provide the required barometric pressure compensation necessary in producing the water level data. Manual monitoring is done using a *Solinst*® and/or *Heron Instruments Inc.* electronic water level meter with both visual and audio indicators.

The electronically monitored wells are typically measured every hour, with increased frequency as required. At the hourly frequency, the following trends can be distinguished in an individual monitoring well:

- Seasonal climate trends;
- Water level changes in the aquifer that is being pumped;
- Water level changes in aquifers connected to the pumped aquifer; and
- Individual precipitation events in unconfined aquifers.

The manually monitored wells are measured once per month. At this frequency only the first three responses listed above can be distinguished.

E.1.3 Climatological Data

To evaluate the reaction of water levels to changes in climatic conditions, precipitation data are monitored at various locations throughout the Region. Within the Region of Waterloo, climate data is collected by Environment Canada at the Region of Waterloo International Airport (WIA) and the Roseville weather station, by the Grand River Conservation Authority (GRCA) at various Dam locations and by the University of Waterloo at a weather station located on the north campus.

E.2 Groundwater Level Collection Protocols

E.2.1 Groundwater Level Monitoring Network Summary Well Checklist

A well checklist and data entry spreadsheet are prepared of all the measuring points where water levels will be collected on a monthly basis. The checklist and spreadsheet are organized by well field so wells in close proximity are grouped together and indicates whether locations are measured with electronic dataloggers or manual measurements only. Once a well is visited, data is entered in the spreadsheet and the well is checked off the list; thus, the checklist and spreadsheet provides an obvious indication that work is unfinished if a location is unchecked and has no data.

E.2.2 Well Inspection

Upon visiting a well for the first time, the well/casing/equipment details are noted, photos taken, and GPS coordinates are recorded in a field book and/or in the monthly data entry spreadsheet. Well/casing/equipment details includes: location, access, condition, materials, diameters, casing security, surface seal condition, requiring repair or not, well/casing stickup measurements from ground level, well total depth, and the type of datalogger and/or sampling equipment installed. Any notable deficiencies, concerns, problems, or changes in the well condition are recorded in a field book and/or in the monthly data entry spreadsheet, as well as, photos are taken. Also, any observed activities taking place around or near the well that are worth noting are recorded in a field book and/or in the monthly data entry spreadsheet.

E.2.3 Monitoring Well Manual Water Level Measurement Procedure

- Unlock well casing and open well casing lid.
- Remove well cap (if present).
- Use an Electronic Water Level meter and lower the probe down the well until the meter beeps to indicate the probe has encountered water.
- The probe is raised up until the beep of the meter stops, indicating the probe is now above the water.
- Then the probe is slowly lowered down until the probe just contacts the water level surface causing the meter to beep.
- At this point the depth (in meters) is read off the water level meter tape from the measuring point of the well (in most cases is the top of the casing or pipe) and this provides the water level depth below the measuring point.
- The date, time, and water level depth measured is recorded in a field book and/or in the monthly data entry spreadsheet.
- This procedure is repeated for each of the well screens inside the well casing.

- Replace well caps.
- Close well casing lid and lock well casing.

E.2.4 Downloading of Water Levels from Electronic Dataloggers Procedure

For Non-Vented (Absolute) Datalogger Models:

In-Situ Inc.® LevelTROLLs® and RuggedTROLLs®, *Van Essen Instruments* Divers®, and *Solinst*® Leveloggers®

- Prior to downloading data from the datalogger, a manual water level is measured in each well screen containing a datalogger.
- The datalogger is pulled out of the well, unthreaded from the cap that is attached to a wire cable and connected to (or placed in) the corresponding datalogger communication device. The communication device is connected to a laptop/tablet PC or a RuggedReader® Handheld PC and the associated datalogger software is started.
- Water level data stored in the datalogger is subsequently downloaded and viewed using the datalogger software and saved on the hard drive/memory.
- Note: downloading data from the datalogger does not automatically stop the datalogger from recording.
- The status of the datalogger is viewed and checked for correct operation and to confirm that the datalogger is hanging in the well water within its operating range.
- Select datalogger details such as the battery level and free/used memory are recorded in a field book and/or in the monthly data entry spreadsheet.
- If the datalogger does not require restarting to free up memory or to change the sample rate, then the datalogger is removed from the communication device and is threaded back onto its cap and lowered back down the well on the wire cable.
- If the datalogger does require restarting to free up memory or to change the sample rate, then the datalogger is stopped, reprogrammed, and restarted using the datalogger software and, as a result, erases the previous data stored in memory on the datalogger.
- This procedure is repeated for each datalogger within each of the well screens inside the well casing.
- After all the non-vented (absolute) dataloggers have been downloaded then the Barometric dataloggers are downloaded following the same procedure as above.

For Vented (Gauged) Datalogger Models:*In-Situ Inc.*® LevelTROLLs®

- Prior to downloading data from the datalogger, a manual water level is measured in each well screen containing a datalogger.
- The desiccant tube is disconnected from the datalogger cable.
- The datalogger cable is connected to a communication cable device that is connected to a laptop/tablet PC or a RuggedReader® Handheld PC and the datalogger software is started.
- Water level data stored in the datalogger is subsequently downloaded and viewed using the datalogger software and saved on the hard drive/memory.
- Note: downloading data from the datalogger does not automatically stop the datalogger from recording.
- The status of the datalogger is viewed and checked for correct operation and to confirm that the datalogger is hanging in the well water within its operating range.
- Select datalogger details such as the battery level, free/used memory, and desiccant condition (colour) are recorded in a field book and/or in the monthly data entry spreadsheet.
- The desiccant tube condition is checked and replaced if necessary.
- If the datalogger does not require restarting to free up memory or to change the sample rate, then the communication cable device is disconnected from the datalogger cable and the desiccant tube is reconnected.
- If the datalogger does require restarting to free up memory or to change the sample rate, then the datalogger is stopped, reprogrammed, and restarted using the datalogger software and, as a result, erases the previous data stored in memory on the datalogger.
- This procedure is repeated for each datalogger within each of the well screens inside the well casing.

E.2.5 Data Entry and Processing into the Burnside MS ACCESS/SQL® Database

- All field data collected (i.e. date, time, manual water level depth measured, comments) and recorded for each well screen and datalogger in a field book is entered into the monthly data entry spreadsheet, unless already entered in the field using a laptop/tablet PC.
- The monthly data entry spreadsheet is checked and reviewed prior to importing the data into a database table using Burnside Water Level Data Tools software. Manual water level depth values are converted into water level elevation values using the software during this import process.
- Any associated well notes, comments, and datalogger details are entered into a database table under the appropriate well and screen.

- Water level data from the dataloggers downloaded to a laptop/tablet PC or a RuggedReader® Handheld PC are transferred to Burnside file folder network upon returning to the office.
- These datalogger water level data files are subsequently read and the data is imported into a database table using Burnside Water Level Data Tools software.
- Using Burnside Water Level Data Tools software, the datalogger water level data are reviewed and processed (as described below) resulting in corrected water level depth values and corrected water level elevation values that are stored in a database table.
- *For Non-Vented (Absolute) Datalogger Models:*
Datalogger water level data is first barometric pressure compensated using selected Barometric datalogger data, then a manual water level depth value measured at the time of the most recent download is applied and used to convert the barometric compensated water level data into corrected water level depth values, which are converted into water level elevation values that are appended to a database table.
- *For Vented (Gauged) Datalogger Models:*
A manual water level depth value measured at the time of the most recent download is applied to the datalogger water level data to convert the water level data into corrected water level depth values, which are converted into water level elevation values that are appended to a database table.
- Temperature data recorded by the dataloggers are also imported into a database table.
- Hydrographs are subsequently created for each well and screen from the water level elevation data in the database for review and presentation. If there are some data points that are erroneous, then these data points are marked as non-reportable (invalid) within the database and/or are removed resulting in them not being plotted on the hydrographs.
- An updated data file is provided to the Region on a quarterly basis for upload into their eWRAS EQUIS database.

