Water Services' Summary Report

January 1, 2022 to December 31, 2022

Guelph Drinking Water System

Corporation of the City of Guelph

Gazer Mooney Subdivision Distribution System

Township of Guelph/Eramosa

Water Services

Environmental Services Department

Last Revision: 2023-03-13

As per the Accessibility for Ontarians with Disabilities Act (AODA), this document is available in an alternate format by e-mailing waterservices@guelph.ca or by calling 519-837-5627; TTY: 519-837-5688 or text 226-821-2132.

This page left intentionally blank.

Contents

List of Tables

List of Figures

Water Services' Summary Report

Purpose

This report is intended to provide the Mayor and Members of Council, as "Owners" of the drinking water system, an understanding of the status of the City of Guelph's drinking Water system for the reporting period of January 1, 2022 to December 31, 2022.

Second, the Safe Drinking Water Act (SDWA) (2002) mandates that it is the responsibility of the municipality to:

- Recognize that the people of Ontario are entitled to expect their drinking water to be safe; and,
- Provide for the protection of human health and the prevention of drinking water health hazards through the control and regulation of drinking water systems and drinking water testing.

Finally, this report has also been prepared to satisfy the requirements of Schedule 22, O. Reg. 170/03 (Summary Reports for Municipalities).

For the 2022 reporting period, a separate Annual Report, which contains data related to annual testing and sampling parameters, was prepared to fulfill Section 11 of O. Reg. 170/03. This report will be posted on the City's website by February 28, 2023.

Scope

This Water Services Summary Report includes information from both the **Guelph Drinking Water System** and the **Gazer Mooney Subdivision Distribution System** for the period of January 1,2022 to December 31, 2022, unless otherwise noted. The information is required to be reported to the following:

- the Drinking Water System Owners:
  - Guelph City Council
  - Township of Guelph/Eramosa (Council and CAO);
- Senior officials of Guelph Environmental Services and Township of Guelph/Eramosa; and
- the general public and interested stakeholders.

A copy of this report is available for viewing at:

- **Online** at guelph.ca/water-testing.

Due to the global pandemic, we encourage the online version of this report be accessed for review.

Any inquiries can be made to:

- City of Guelph Water Services by e-mailing waterservices@guelph.ca or by calling 519-837-5627.
- Township of Guelph/Eramosa Public Works – Water / Wastewater by e-mailing general@get.on.ca or by calling 519-856-9596.

Notice

Please note that every reasonable effort is made to ensure the accuracy of this report. This report is published with the best available information at the time of publication. In the event that errors or omissions occur, the online report will be updated. Please refer to the online version of the report for the most current version.

Systems Overview

Guelph Drinking Water System

Water Services at the City of Guelph is committed to providing consumers with a safe, consistent supply of high-quality drinking water while meeting or exceeding, and continually improving on legal, operational, and quality management system requirements. Water Services strives to provide reliable and cost-effective water treatment and distribution systems for the safe production and delivery of high-quality water. Established in 1879, Water Services is a municipally owned and operated water utility.

The Guelph Drinking Water System is classified as a Class II Water Treatment Subsystem and a Class IV Water Distribution Subsystem. All necessary licences have been obtained by staff to operate the Guelph Drinking Water System. As of December 31, 2022, 31 team members held drinking water certificates to operate and maintain the water system.

In 2022, Water Services maintained full accreditation to the DWQMS Version 2.0 after a successful on-site verification audit, conducted by the third-party accreditation body - NSF International Strategic Registrations. This accreditation satisfies part of the requirements under the Municipal Drinking Water Licensing Program.

Water Distribution System

The distribution system (including watermains, valves, fire hydrants, water services, and meters) serves a population of approximately 144,800[1] within the City of Guelph. All new system components meet NSF 61[2] and NSF 372[3] requirements, or approved equivalents, and are installed and maintained in accordance with approved industry standards. Water system customers are fully metered and billed in accordance with the Water and Wastewater Customer Rates and Charges by-law. For more information on water rates, please refer to My water bill and rates on the City of Guelph website.

The Guelph Drinking Water System distribution system is comprised of the following infrastructure:

- 6.47 kilometres of a 900-1,050 mm diameter water supply aqueduct,
- five underground storage reservoirs with a combined approximate capacity of 48,000 cubic metres (48 million litres),
- three water towers with a combined approximate capacity of 11,200 cubic metres (11.2 million litres),
- approximately 560.8 kilometres of in service buried watermain with a diameter < 900 mm,
- 4,325 watermain valves,
- 2,835 fire hydrants; and
- approximately 47,000 water services and water meters.

Guelph Source Water and Treatment Facilities

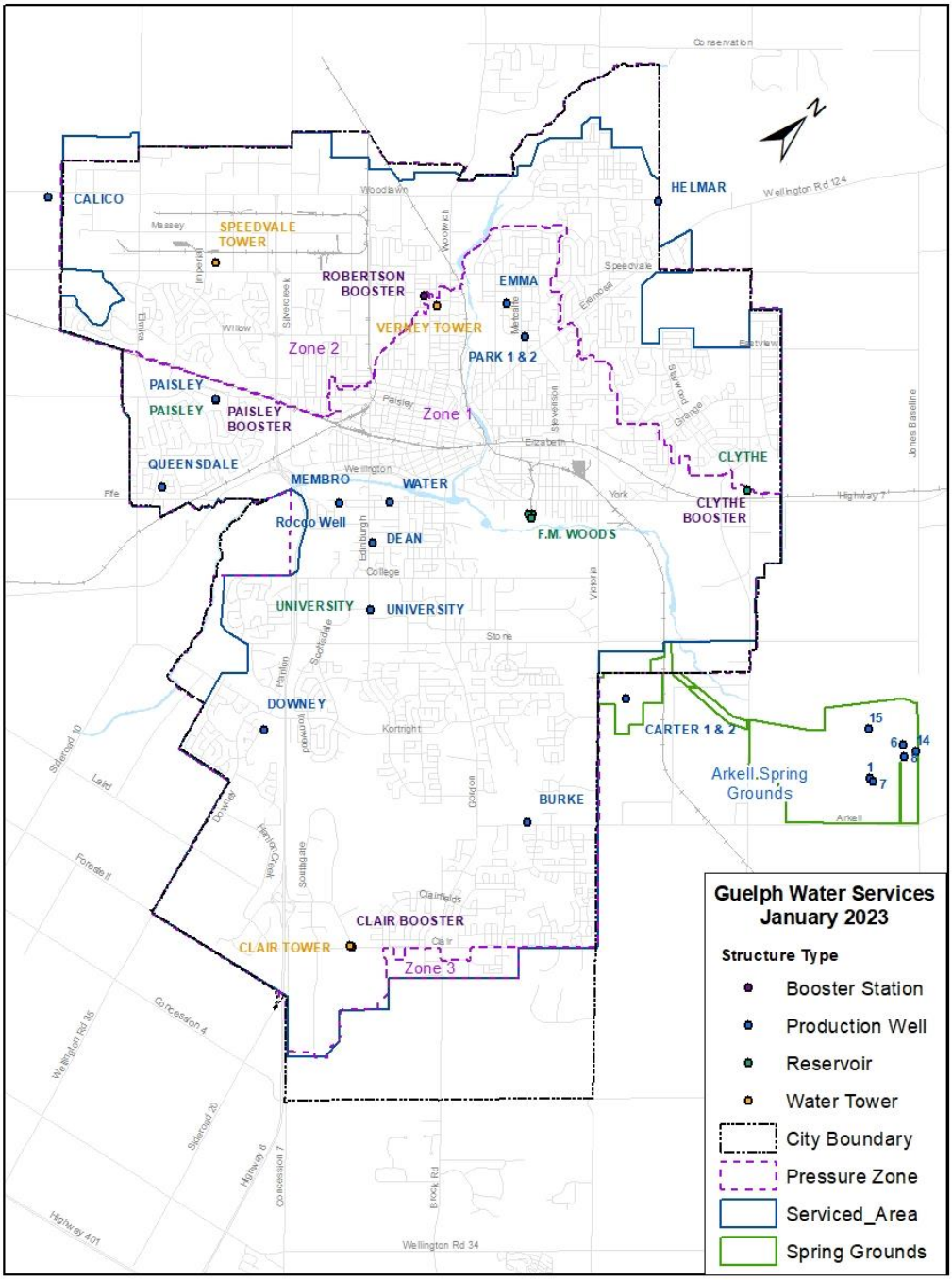
The source of Guelph's drinking water is a series of 21 operational groundwater wells and a shallow groundwater collector system. The drinking water sources consist primarily of true groundwater, with some "groundwater under the direct influence of surface water with effective in-situ filtration" (GUDI-WEF) sources. The GUDI-WEF sources include: Carter Well 1 and 2; Arkell 1; Arkell 15; and the Arkell Springs Glen Collector System.

Figure 1: Guelph Drinking Water System shows the locations of the Guelph Drinking Water System facilities as of January 2023.

---

[1] City of Guelph census equivalent population estimate for end of year in 2021.
[2] NSF/ANSI Standard 61: Drinking Water System Components – Health Effects
[3] NSF/ANSI Standard 372: Drinking Water System Components – Lead Content

Figure 1: Guelph Drinking Water System



Gazer Mooney Subdivision Distribution System

The Gazer Mooney Subdivision Distribution System is a Class 1 Distribution Subsystem that serves approximately 209[4] people and is owned by the Township of Guelph/Eramosa. The system is operated by Guelph Water Services through a legal agreement that was signed by representatives of the City of Guelph and the Township of Guelph/Eramosa. The current agreement came into effect on March 1, 2019 and will continue until February 29, 2024 and will be automatically renewed and extended to February 28, 2029, unless terminated earlier.

All of the water for the Gazer Mooney Subdivision Distribution System is supplied from the Guelph Drinking Water System. All water is treated to provincial standards in the Guelph Drinking Water System and no further treatment chemicals are added to the Gazer Mooney Subdivision Distribution System.

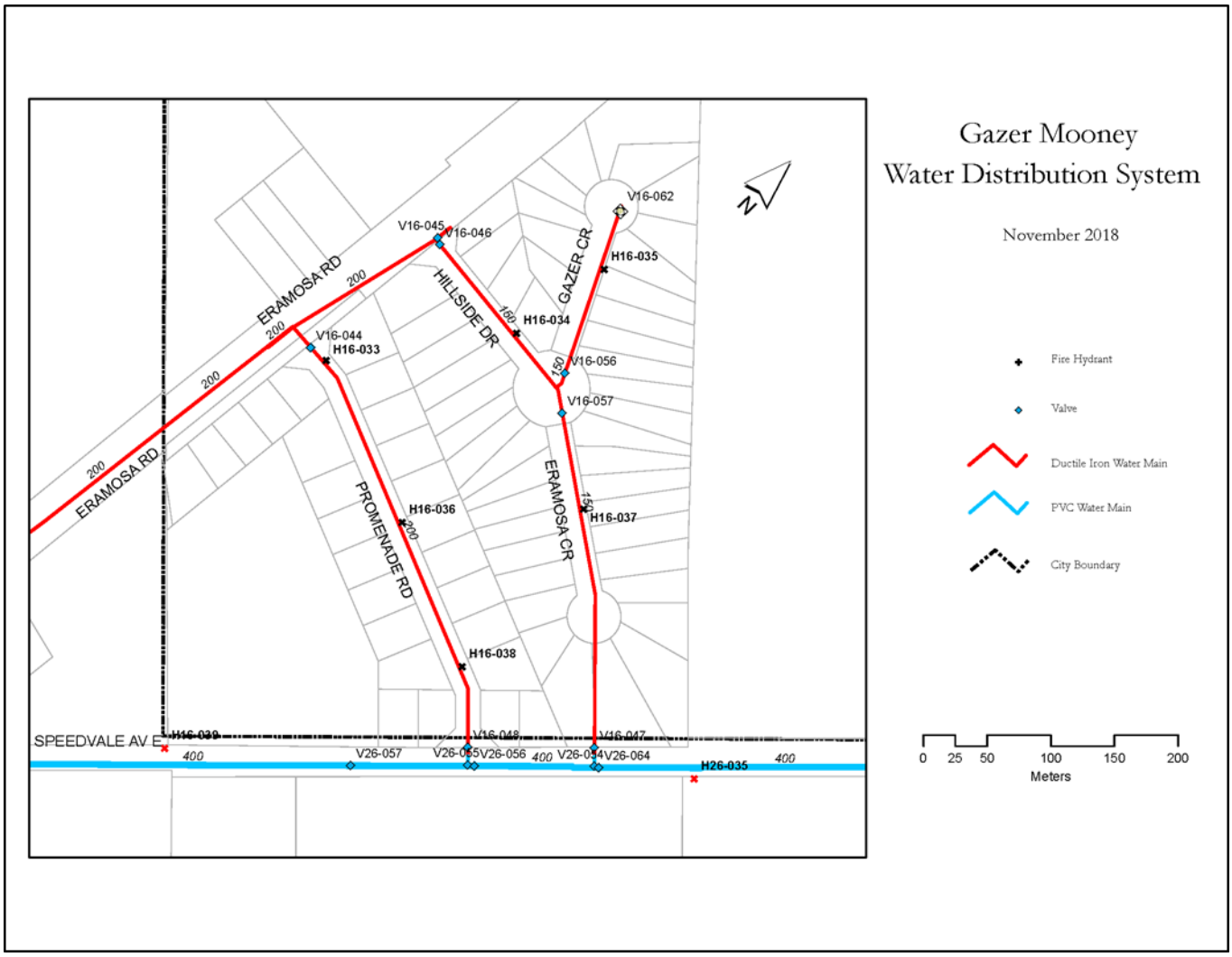
The Gazer Mooney Subdivision Distribution System is comprised of the following infrastructure:

- approximately 650 meters of 200mm diameter watermain;
- approximately 600 meters of 150mm diameter watermain;
- six watermain valves;
- six fire hydrants;
- one sampling station; and
- approximately 72 water services and water meters.

An overview of the Gazer Mooney Subdivision Distribution System (current as of November 2018) is illustrated in Figure 2: Gazer Mooney Subdivision Distribution System.

[4] Estimated, based on 72 water connections multiplied by 2.9 people per household (as per Statistics Canada for low density residential).

Figure 2: Gazer Mooney Subdivision Distribution System



Quality Management System

Management Review

At least once every calendar year, Water Services' Management and other key members from Water Services' support teams meet to evaluate the adequacy and effectiveness of Water Services' Quality Management System (QMS). Key information reviewed at the meeting, includes, but is not limited to incidences of regulatory non-compliance and

corrective actions taken. The results of the meeting, including decisions or action items to prompt changes and improvements in Water Services' QMS are communicated to City of Guelph (owner of the Guelph Drinking Water System) and Township of Guelph/Eramosa Council (owner of the Gazer Mooney Subdivision Distribution System) by inclusion in this report, see Appendix A: Management Review Minutes.

The review provides evidence of continued endorsement and commitment to the QMS from Water Services Management and other key members from Water Services' support teams.

Regulatory Compliance

Compliance with Terms and Conditions of System Approval and Other Orders

The City of Guelph fulfilled the requirements of the Safe Drinking Water Act, its regulations and the terms and conditions of the Municipal Drinking Water Licences for the Guelph Drinking Water System and the Gazer Mooney Subdivision Distribution System; exceptions, if any, are detailed in Table 1: Summary of Non-compliance events and actions taken.

As the Operating Authority for both the Guelph Drinking Water System and the Gazer Mooney Subdivision Distribution System, Guelph Water Services' is inspected annually by the Ministry of the Environment, Conservation and Parks (Ministry) for compliance with regulatory requirements.

Table 1: Summary of Non-compliance events and actions taken, includes non-compliance events that were identified by the Ministry in the 2021-2022 drinking water inspection of the Guelph Drinking Water System and Gazer Mooney Subdivision Distribution System (see items 1, 2, 4 and 5 in Table 1 below) and it includes a non-compliance event that was identified by Water Services after the 2021-2022 Inspection Report was issued (see item 3 in Table 1 below).

The annual MECP Inspection for the Guelph Drinking Water System and the Gazer Mooney Subdivision Distribution System which began November 3, 2022 was still in-progress at the time of this report. Any updates related to regulatory compliance, coming out of the Inspection Reports (once received), will be captured in the 2023 Water Services Summary Report.

Table 1: Summary of Non-compliance events and actions taken, excludes any non-compliance events that were previously reported in the 2021 Water Services Summary Report.

Guelph Drinking Water System

There were four (4) incidents of non-compliance associated with the Guelph DWS in 2022. For details, please refer to Table 1: Summary of Non-compliance events and actions taken.

Gazer Mooney Subdivision Distribution System

There was one (1) incidents of non-compliance in the Gazer Mooney SDS in 2022. For details, please refer to Table 1: Summary of Non-compliance events and actions taken.

Table 1: Summary of Non-compliance events and actions taken

#	Drinking Water System	Legislative Requirement	Statement of Non-compliance	Corrective Action
1	Guelph Drinking Water System	Ontario Regulation 170/03, subsection 10.1 (3). The owner of the drinking water system must notify the Ministry of all changes to the system registration information within ten (10) days of the change.	All changes to the system registration information were not provided within ten (10) days of the change. The non-compliance was identified in the 2021-2022 Ministry Inspection of the Drinking Water System.	Water Services (on behalf of the owner) updated the system registration information and submitted it to the Ministry when it was discovered that the information was incorrect.
2	Guelph Drinking Water System	Ontario Regulation 170/03, subsection 1-2 (1) of Schedule 1. The owner must maintain the production well(s) in a manner sufficient to prevent entry into the well of surface water and other foreign materials.	Observation made in the 2021-2022 Ministry Inspection that four (4) wells did not have their water level monitoring access ports capped.	Water Services (on behalf of the owner) secured the access ports and provided training to system operators on the issue.

#	Drinking Water System	Legislative Requirement	Statement of Non-compliance	Corrective Action
3	Guelph Drinking Water System	Ontario Regulation 170/03, subsection 1-2 (2) of Schedule 1. The owner and the operating authority of the system must ensure that water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined.	Water Services identified that water treatment equipment which provides chlorination or chloramination for secondary disinfection purposes was not operated so that at all times and all locations in the distribution system the chlorine residual was never less than 0.05 mg/l free or 0.25 mg/l combined (Adverse Water Quality Incident, AWQI# 159877). There was one (1) Adverse Water Quality Incident (AWQI) reported to the Ministry by Water Services for low chlorine residuals sampled at a temporary dead-end location created by construction work (Dawson Road Sample Station) in 2022. AWQI# 159877.	Water Services immediately flushed the watermain on Dawson Road and restored secondary disinfection. Added the location to the flushing program to maintain a compliant residual value for the remainder of the re-construction project that created the dead-end.

4	Guelph Drinking Water System	Safe Drinking Water Act, 2002 (SDWA), subsection 31 (1) No person shall, alter or replace a municipal drinking water system except under the authority of and in accordance with an approval under Part V of the SDWA or a drinking water works permit. In addition, no person shall, use or operate a municipal drinking water system except under the authority of and in accordance with an approval under Part V of the SDWA or municipal drinking water licence.	Observation made in the 2022-2023 Ministry Inspection that the operations and maintenance manuals did not meet the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA. The operations and maintenance manuals met the requirements of the Drinking Water Works Permit and Municipal Drinking Water Licence issued under Part V of the SDWA except for the CT Calculation section for the Membro Pumphouse. The CT Calculation was not updated after the recent upgrade and did not reflect the current conditions at the time of inspection.	Water Services updated the operations and maintenance manual to meet the requirements in the municipal drinking water licence.
5	Gazer Mooney Subdivision	Ontario Regulation 170/03, subsection 10.1 (3).	All changes to the system registration information were not provided within ten (10) days of the change. The non-compliance	The system owner (Township of Guelph/Eramosa) updated the system registration information and submitted it to the Ministry when it

#	Drinking Water System	Legislative Requirement	Statement of Non-compliance	Corrective Action
	Distribution System	The owner of the drinking water system must notify the Ministry of all changes to the system registration information within ten (10) days of the change.	was identified in the 2021-2022 Ministry Inspection of the Drinking Water System.	was discovered that the information was incorrect.

Operational Performance

The following section describes Operational Performance statistics within Water Services that includes:

- 2022 Totalized Pumpages as per the Municipal Drinking Water Licence and Permits to Take Water;
- 2022 Instantaneous Flows as per Permit to Take Water;
- Water Production, Consumption and Population;
- Water Supply Capacity.

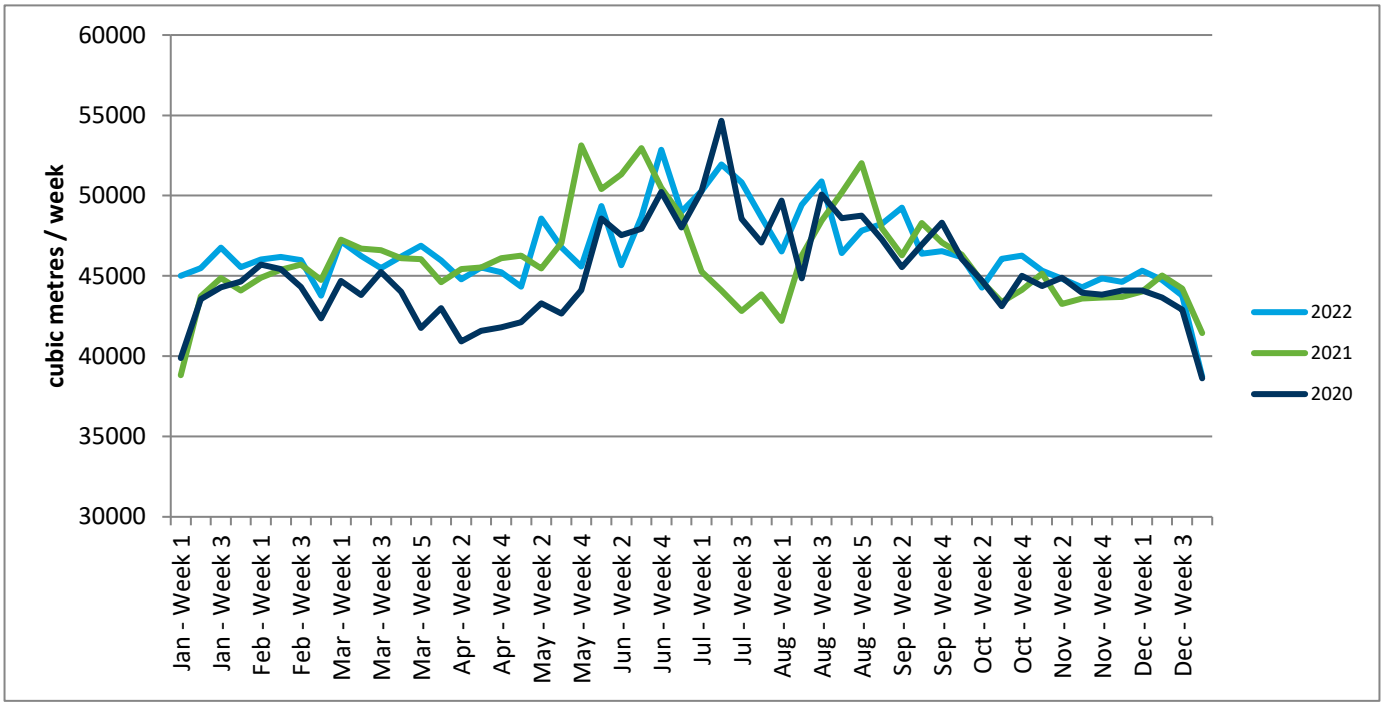
2022 Totalized Pumpages and Instantaneous Flows

The Ontario Water Resources Act and the Safe Drinking Water Act, each require that operating authorities record and report both water takings as governed by Permits-to-Take-Water and treated water supplied to the City of Guelph.

Summaries of total water pumped, instantaneous flows and capacity (flows and volumes compared to rated capacities) by the City of Guelph can be found in Appendix B: Total Water Pumped and Instantaneous Flows.

Figure 3: Totalized Treated Water Pumpages, depicts the Guelph Drinking Water System treated water pumpages in cubic metres as a weekly average. Using a weekly average allows for less data points resulting in a simplified graph for the purpose of this report.

Figure 3: Totalized Treated Water Pumpages, 2020-2022



Water Services processed 16,988,445 cubic metres (17.0 billion litres) of water to the distribution system in 2022. This represents 1.2 per cent more water being supplied to the distribution system in 2022 as compared to 2021 and 2.9 per cent less water than in 2020.

The 2022 average daily water demand was 46,544 cubic metres (46.5 million litres). The maximum daily production of water in 2022 was 58,361 cubic metres (58.4 million litres) and occurred on June 23, 2022. The minimum daily production of water in 2022 was 35,253 cubic metres (35.3 million litres) and occurred on December 26, 2022.

Water Production, Consumption and Population

Figure 4: Guelph Water Production vs. Water Consumption vs. Population, 2012 - 2022, below, shows the City of Guelph's annual average daily water production, annual average daily consumption, annual peak day demand, and population from 2012 to 2022[5].

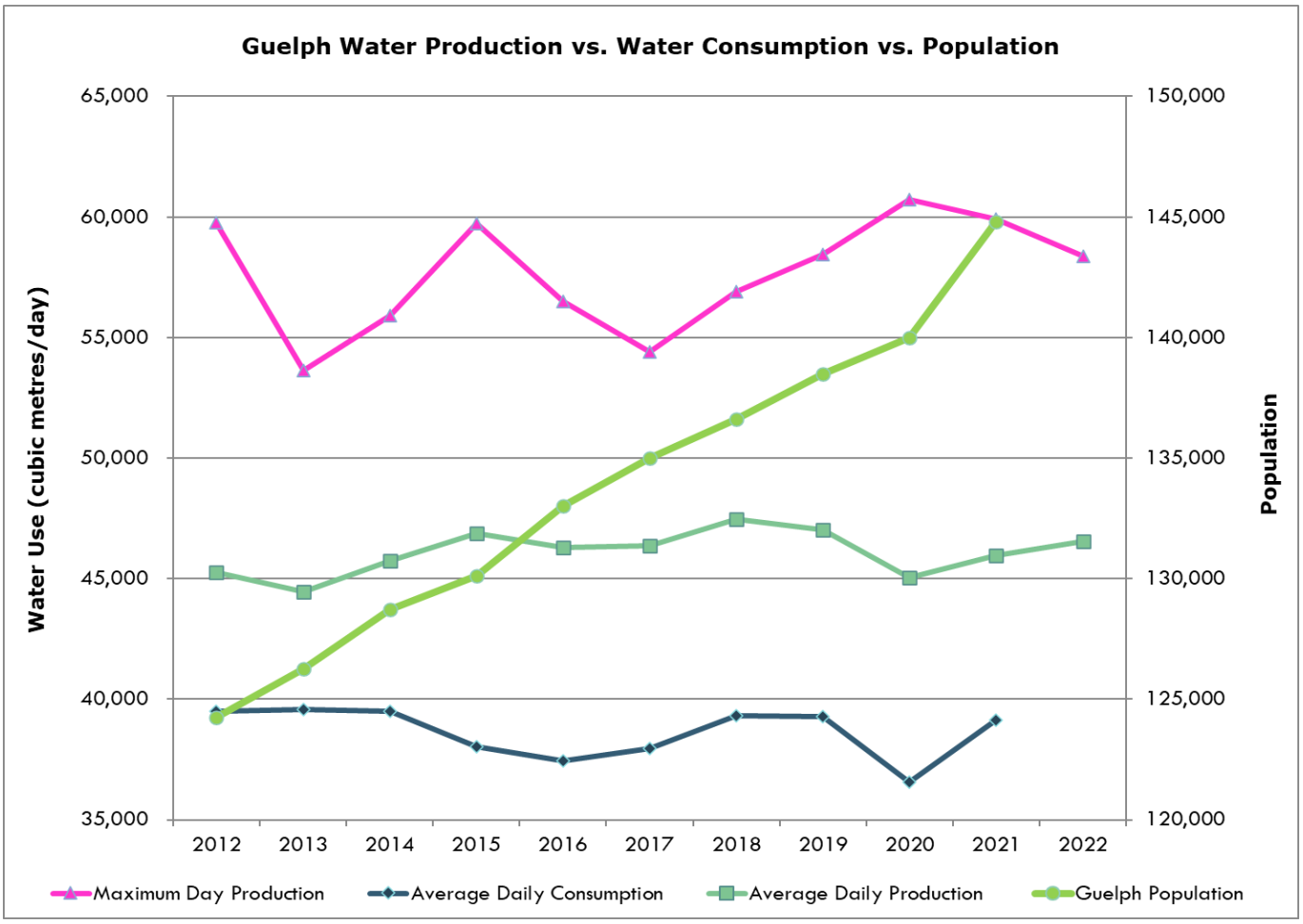
From 2012 to 2021 Guelph's population increased by 16.5%, whereas the annual average consumption decreased by 1%.

Fluctuation in water production and consumption is anticipated to occur, year to year, based on a number of factors, including seasonal temperatures and annual precipitation, system

demands (including planned and unplanned maintenance) and steady population growth; however, the steady to reduced water consumption (and production) rates year over year are attributed to Guelph's Water Efficiency Strategy, Water Loss Management Plan, and resulting programming, as described later in this section. Further, the impacts to consumption (and production) across sectors varied throughout the 2020 year, which can likely be attributed to changes in societal behaviour as a result of the pandemic. While residential consumption increased through 2020 across all three residential sectors (low, medium and high-density), industrial, commercial and institutional consumption was decreased. A significant portion of the precipitous drop in 2020 can be attributed to these changes.

Figure 4: Guelph Water Production vs. Water Consumption vs. Population, 2012-2022[5]

[5] 2022 Consumption and Population data was not available when Figure 4: Guelph Water Production vs. Water Consumption vs. Population, 2012 – 2022 was prepared.



Water Supply Capacity

Water Services staff uses source specific calculated firm capacity values in order to aid planning of scheduled shutdowns and maintenance of the water supply wells. Staff hold monthly meetings to review project and programming activities that affect firm capacity. The purpose of the monthly meetings are to ensure adequate servicing capacity is available to meet the City's water demands while maintenance and capital upgrades are undertaken to maintain the system in a fit state of repair.

Values used for permitted pumping rate and firm capacity calculations by well are provided below in Table 2: Permitted Rates and Point of Entry Firm Capacities of Water Supply Wells (includes only wells that were in-use for production/supply in 2022). The permitted pumping

rate is the rate of pumping allowed as identified in the Permits to Take Water. The firm capacity rate is the actual rate of pumping that can be sustainably achieved at each well.

Table 2: Permitted Rates and Point of Entry Firm Capacities of Water Supply Wells

Well Name	Permitted Daily Maximum (m3/day)	Permitted Rate (L/s)	Point of Entry Firm Capacity[6] (m3/day)	Point of Entry Firm Capacity[6] (L/s)
Arkell 1	3,273	37.9	1,640	19.0
Arkell Springs Wellfield[7]	28,800	333.3	28,800	333.3
Arkell Infiltration Gallery (Glen Collector)	25,000	290	5,908	59
Burke	6,546	75.8	5,790	60.0
Carter 1 and Carter 2	7,855	75.8	5,184	60.0
Membro	6,050	78.0	3,200	37.0
Water St.	3,400	44.4	1,702	19.7
Dean	2,300	34.6	1,500	17.4
University	3,300	38.2	1,500	17.4
Downey	5,237	60.6	3,456	40.0
Park 1 and Park 2	10,300	119.2	9,500	110.0
Emma	3,100	35.9	2,330	27.0

[6] The firm capacity rate is the actual rate of pumping that can be achieved at each well.
[7] The Arkell Springs Wellfield consists of five (5) municipal drinking water production wells: Arkell 6, Arkell 7, Arkell 8, Arkell 14 and Arkell 15. All of the aforementioned Arkell Wells are contained within the same Permit to Take Water. Notwithstanding the specified maximum permitted taken per day, any combination of these wells can be used to obtain the permitted rate.

Well Name	Permitted Daily Maximum (m3/day)	Permitted Rate (L/s)	Point of Entry Firm Capacity[6] (m3/day)	Point of Entry Firm Capacity[6] (L/s)
Helmar	3,273	37.9	804	9.3
Paisley	3,200	37.0	804	9.3
Calico	5,237	60.6	1,040	12.0
Queensdale	5,237	60.6	501	5.8

Appendix A: Management Review Minutes

Meeting Minutes

Meeting	**Management Review – 2022**
Date	February 15, 2023
Time	9:00 a.m. – 12:00 p.m.
Location	WS Boardroom and MS Teams (Hybrid option)
Present	Kelly Beirnes, Ryan Costello, Liana D'Andrea, Paula Edgerton, Wayne Galliher, Terry Gayman, Dawn Hamilton, Shawna Hughes, Deigh Madejski, Mathew Newman, John-Paul Palmer, Kristin Pressey, Peter Rider, Stephanie Shouldice, Nathan Siniowski, Tim Spence, Emily Stahl, Mike Taylor, Chris Vanderveen
Regrets	Clint Davis, Mari MacNeil, Angela VanderGugten,

Discussion Items

An information package (Management Review Information Package - 2023) was circulated to all meeting attendees on February 6, 2023, in advance of the meeting.

The information in the package was reviewed at the Management Review – 2022 on February 15, 2023. The minutes for the meeting are documented below and include decisions or action items to prompt changes and improvements in Water Services Quality Management System.

Meeting Minutes

Item #	Discussion Items	Actions / Decisions (for deficiencies or recommendations)
1.	Introduction - Reviewed purpose of QMS and Management Review.	- None.
2.	System Overview - Reviewed scope of QMS, which includes Guelph Drinking Water System (water treatment subsystem, class 2 and distribution subsystem, class 4) and Gazer Mooney Subdivision Distribution System. Water Services is the operating authority for both systems.	- None.
3.	a) Incidents of regulatory non-compliance - Reviewed Management Review Information Package – 2023, subsection 3.	- In the Water Services Summary Report – draft, specify which report

	a) Incidents of Regulatory NonCompliance. - Recommendation: Clarify that the owner (Township of Guelph/Eramosa) was responsible and took corrective action for addressing the regulatory non-compliance for the Gazer Mooney Subdivision Distribution System identified in Table 1 (Summary of Non-compliance events and actions taken) in the Water Services Summary Report – draft. - Deficiency/Recommendation: although a root cause analysis was conducted for each regulatory non-compliances identified in the 2021-2022 Ministry Inspection Report (Guelph Drinking Water System), verify that the records for each root cause analysis are complete. E.g., ensure that the root cause analysis forms are complete and that corrective actions have been entered and are being tracked in the Continual Improvement database. - Recommendation: consider if a Work Instruction should be developed for completing QMS 21-01 Root Cause Analysis Form.	period the results were obtained (e.g., 2021-2022 Inspection Report or 2022-2023 Inspection Report). Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update. No CIR# created.** - In the Water Services Summary Report – draft, update the responsible party for the noncompliance issued for the Gazer Mooney Subdivision Distribution System. Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update. No CIR# created.** - Verify that root cause analysis records for each regulatory noncompliance from the 2021-2022 Ministry Inspection Report are complete and corrective actions have been entered into the Continual Improvement database and are being tracked. Action assigned to Deigh Madejski, due April 15, 2023. **See CIR# 1348.** - Consider if a Work Instruction should be developed for completing QMS 21-01 Root Cause Analysis Form.

		Alternatively, consider if instructions can be added to the form. Action assigned to Deigh Madejski, due date to be marked pending. **See CIR# 1349.**

4.	b) Incidents of Adverse Drinking Water Tests - Reviewed Management Review Information Package – 2023, subsection 3. b) Incidences of Adverse Drinking Water Tests.	- None.
5.	c) Deviations from Critical Control Point (CCP) and limits (CCL) and response actions - Reviewed Management Review Information Package – 2023, subsection 3. c) Deviations from Critical Control Point (CCP) and limits (CCL) and response actions.	- None.
6.	d) The effectiveness of the risk assessment process - Reviewed Management Review Information Package – 2023, subsection 3. d) the effectiveness of the risk assessment process.	- None.
7.	e) Internal and external DWQMS audit results - Reviewed Management Review Information Package – 2023, subsection 3. e) Internal and external DWQMS audit results.	- None.
8.	f) Results of emergency response testing - Reviewed Management Review Information Package – 2023, subsection 3. f) results of emergency response testing.	- None.

9.	g) Operational performance and statistics – Water Production, Consumption and Population - Reviewed the applicable section of the Management Review Information Package – 2023. - Raw water taking for the drinking water system was completed in accordance with each Permit-to-Take-Water (PTTW) (i.e., no limit exceedances). - The drinking water system operated in compliance with the rated capacity limits set out in the Municipal Drinking Water Licence (MDWL). - (re: Figure 3: Totalized Treated Water Pumpages, 2020-2022), Peak demand day in 2022 was due to weather driven event.	- In future Management Review Information Packages, consider if comments should be added to explain peak or minimum day demand (e.g., weather driven event or operational driven event). Assigned to Deigh Madejski, due by next Management Review (December 31, 2023). **See CIR# 1350**.

	- Discussed the value of providing further trend analysis on graphs provided in future Management Reviews (re: Figure 3: Totalized Treated Water Pumpages, 2020-2022). Additional comments may help to provide context/accessibility to the reader (e.g., water demand is always low during a certain time-period or always high during a certain time and due to weather driven event or operational driven event).	
10.	g) Operational performance and statistics – Water Production, Consumption and Population - Reviewed the applicable section of the Management Review Information Package – 2023.	- None.

11.	g) Operational performance and statistics – Water Supply Capacity - Reviewed the applicable section of the Management Review Information Package – 2023. - Clarified that Clythe Well was not included in Table 2 (Permitted Rates and Point of Entry Firm Capacities of Water Supply Wells) of the 2022 Water Services Summary Report because the well is outof-service. Table 2 (Permitted Rates and Point of Entry Firm Capacities of Water Supply Wells) of the 2022 Water Services Summary Report only includes a list of wells that are in-service. - Although there are Ministry approved water taking limits for each well, achieving those limits can be challenging (e.g., due to physical infrastructure constraints).	- None.
12.	g) Operational performance and statistics – Program Activities, Table 2: Water Distribution Maintenance Program Activity, 2022 - Reviewed the applicable section of the Management Review Information Package – 2023. - Several maintenance activities took place in the distribution system in 2022. - Clarified that -400C is per the policy and it is the cumulative temperature total from the first frost. -400C is a critical marker because we do not reach it every year, but it was reached last year. Could remove -400C value if it causes confusion or could keep the value and make the comment that it is per the Policy.	- Add comment that -400C is per the Policy. Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update. No CIR# created.**

13.	g) Operational performance and statistics – Program Activities, Table 3: Water Treatment Maintenance Activity, 2022 - Reviewed Management Review Information Package – 2023, subsection 3. g) Water Treatment Maintenance Activity, 2022. - Several maintenance activities took place in the treatment system in 2022.	- None.
14.	g) Operational performance and statistics – Program Activities, Table 4: SCADA Maintenance Program Activity, 2022 - Reviewed the applicable section of the Management Review Information Package – 2023. - Several SCADA related maintenance activities took place in the distribution system in 2022. - Although not identified in the Management Review Information Package – 2023, the physical security upgrades (re-keying of drinking water system facilities) completed in 2022 were discussed.	- Add physical security upgrades to Table 4 (SCADA Maintenance Program Activity, 2022). Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update.** **No CIR# created.**
15.	g) Operational performance and statistics – DWWP, Table 5: Modifications or Additions to the DWS, 2022 - Reviewed the applicable section of the Management Review Information Package – 2023. - Although a Form 2 was completed for the addition of an in-line pressure transmitter (Gazer-Mooney Subdivision Distribution System), it was not required. - Confirmed that Table 5: Modifications or Additions to the Drinking Water System should include all statistics, including 0 forms completed. This was recommended/requested in a previous Management Review.	- In Table 5 (Modifications or Additions to the DWS, 2022) in the Management Review Information Package – 2023, add note that Form 2 was not required for the Gazer Mooney Subdivision Distribution System. Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update.** **No CIR# created.**

16.	g) Operational performance and statistics – Table 6: Backflow Devices Installed by Type - Reviewed the applicable section of the Management Review Information Package – 2023. - Confirmed that Table 6: Backflow Devices Installed by Type should continue to be included in future Management Review meetings because it is applicable to the review of the drinking water system. - Discussed how the success of Building Services backflow prevention program affects the drinking water system. - Recommendation made to review critical control point for backflow prevention and determine if there is information from Building Services backflow prevention program that would be beneficial to add to the procedure (see QMS-08-02 – Summary of Critical Control Points and Critical Control Limits).	Add text to Management Review Information Package that helps to demonstrate why backflow device statistics are applicable to the review of the drinking water system. Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update. No CIR# created.** - Determine if there is information from the Building Services backflow prevention program that should be mentioned in QMS-08-02-Summary of Critical Control Points and Critical Control Limits and share the outcomes of the review with Top Management. Assigned to Deigh Madejski (in consultation with Water Compliance Specialist), mark action as pending. **See CIR# 1351**.

17.	h) Raw and treated water quality and drinking water trends – Annual Reports (section 11, O. Reg. 170/03) for Guelph Drinking Water System and Gazer Mooney Subdivision Distribution System - Reviewed the applicable section of the Management Review Information Package – 2023. - Water quality test results in Annual Reports are for one year and demonstrate that sampling was conducted as required and test results met applicable drinking water quality standards. Water Services conducts internal reviews of broader range water quality data. Consideration can be made to include broader range water quality trends to the Management Review or point to where more information can be found. - Suggestion made to include trends for raw water sodium and chloride, but also noted that a note could be added to Management Review where more information could be found on these trends. - Sampling program (e.g., sample location, frequency and purpose) has been established and is reviewed by applicable Compliance and Performance and Water Services personnel. Consider if it would be beneficial to also include members of Water Services Technical Services team in the review of the sampling program.	- Determine if there are additional raw and treated water quality trends that should be considered in Management Review. Assigned to Deigh Madejski (in consultation with Water Compliance Specialist and Technical Services Manager and Supervisor Water Treatment), due by December 31, 2023. **See CIR# 1352**. - Consider including the Water Services Technical Services team in the review of the Water Services sampling program. Assigned to Deigh Madejski (in consultation with Water Compliance Specialist and Technical Services Manager and Supervisor Water Treatment), due by December 31, 2023. **See CIR# 1353**.

18.	h) Raw and treated water quality and drinking water trends (Lead Reduction Plan and Lead Sampling for Guelph Drinking Water System and Gazer Mooney Subdivision Distribution System) - Reviewed the applicable section of the Management Review Information Package – 2023. - Lead sampling activities were completed in accordance with the Lead Sampling Plan in 2022. - Recommendation made to identify how many lead services, which are owned by the City and that the City is aware of that remain in the drinking water system. It was also noted that seven hundred thirty (730) City-owned lead service lines have been replaced and there are approximately ten (10) City-owned lead services that remain in the drinking water system that Water Services is aware of.	- In the next Management Review, continue to report number of City-owned lead services replaced and add the number of City owned lead services that remain in the drinking water system. Assigned to Deigh Madejski, due by December 31, 2023. **See CIR# 1354**.
19.	i) Follow-up action items from previous Management Reviews - Reviewed the applicable section of the Management Review Information Package – 2023. - No action items raised in last year's Management Review and all action items raised in Management Review prior to last year are marked closed in the Continual Improvement tracking database.	- None.
20.	j) The status of management action items identified between reviews	- Consider if improvements can be made to the way the information on action

	- Reviewed the applicable section of the Management Review Information Package – 2023. - An opportunity was offered for attendees to share any comments that they had on the information for this section. It was confirmed that the actions that were raised in the 2022 Emergency Response Text Exercise Debrief have been entered into the Continual Improvement. - Actions are entered into the Continual Improvement database and tracked by the Quality Management Specialist. - Opportunity for Improvements (OFIs) from internal and external audits were entered into the database and are being tracked. Many remain open, but will be addressed prior to the next internal DWQMS audit, which is planned for Q2 2023. All external DWQMS audit OFIs will be implemented. - Recommendation to change the format of how action item information is presented in future Management Reviews. For example, instead of listing the detail of each action item, consider creating graphs that illustrate the number of action items opened by type (e.g., non-compliance, non-conformance, opportunity for improvement, emergency response test exercise debrief) and by year and then provide detail on open action items and rationale on why they remain open (e.g., completion due date has not passed).	items is shared in Management Review (e.g., prepare graphs that show number of items opened by type and by year and review details on items that remain open, including rationale on why they remain open). Assigned to Deigh Madejski, due by December 31, 2023. **See CIR# 1355**.

21.	k) Changes that could affect the drinking water system and the quality management system - Reviewed the applicable section of the Management Review Information Package – 2023. - Discussed that although Admiral Well (a City-owned well) is not connected to the Guelph Drinking Water System, it is listed in the Municipal Drinking Water Licence (MDWL). It was agreed that any wells that are listed in the MDWL could be included in Table 11: Guelph Drinking Water System Permit to Take Water (PTTW) of the Management Review	- Consider renaming the title of Table 11 in future Management Review Information Packages to reflect that PTTWs listed in the table are the same PTTWs listed in the systems MDWL. Action assigned to Deigh Madejski, due February 28, 2023. **Administrative update.** **No CIR# created.**

	Information Package, but consideration could be given to renaming the name of the table (e.g., City-owned wells listed in the MDWL). - Recommendation made to re-evaluate purpose of including Sentry monitoring well data in Management Review. If it is determined that the data helps Top Management to make decisions about the QMS in Management Review, then continue to include the data and move it to the raw and treated water quality trends section of Management Review. - The following recommendations were made with respect drinking water operator certificates: • add the class of subsystems operated by Water Services to the staff certification section of Management Review to help demonstrate that staff hold the required certifications. Guelph Drinking Water System includes a Class II Water Treatment subsystem and a Class IV Distribution subsystem. The Gazer Mooney Subdivision Distribution System includes a Class I Distribution subsystem. • remove the number of Water Services personnel that hold Distribution & Supply certification from Management Reviews since the Guelph and Gazer Mooney Subdivision systems only include Water Treatment and Distribution subsystems. (Note: operators that hold Water Distribution & Supply certificates are deemed to hold Distribution certificates. Ensure proper accounting of number of certificates held by staff when removing Distribution & Supply certificates from Management Review). • clarify who holds water operator certification (e.g., staff hired to perform operational duties or other staff that hold certification, but do not formally conduct operational duties).	- Re-evaluate the purpose of including Sentry monitoring well data in the Management Review Information Package and move the information to the raw and treated water quality trends section of Management Review if it will continue to be included in Management Review. Assigned to Deigh Madejski (in consultation with Water Services Technical Service team and Water Compliance Specialist), due by December 31, 2023. **See CIR# 1356**. - Modify Table 15 (Water Services Drinking Water Operator Certificates) for future Management Reviews by: 1) adding type and class of subsystems in the Guelph Drinking Water System and Gazer Mooney Subdivision Distribution System; 2) removing Water Distribution & Supply column or clarifying that Water Distribution & Supply certificate holders are deemed to hold Water Distribution certification; and 3) add only the number of valid certificates held by personnel hired to perform operational duties on a routine basis. Assigned to Deigh Madejski, due by

		December 31, 2023. **See CIR# 1357**.

22.	l) Consumer Feedback - Reviewed the applicable section of the Management Review Information Package – 2023. - For future Management Reviews, clarify if data reviewed is # of calls or # of services requests (there could be multiple calls for a single service request). - Recommendation made to review what additional consumer feedback information is available and would be beneficial to include in Management Review (e.g., are all service requests relating to discoloured water related to one event or multiple events).	- Determine if additional information on consumer feedback is available and if it would be beneficial to include it in Management Review (e.g., are all service requests relating to discoloured water related to one event or multiple events). Assigned to Deigh Madejski, mark item as pending. **See CIR# 1358**.
23.	m) Resources need to the maintain the quality management system - Reviewed the applicable section of the Management Review Information Package – 2023. - Resources need to maintain the quality management system continue to be the same (e.g., human resource, financial resources, effective document control system). No major challenges encountered.	- None.
24.	n) Results of the infrastructure review (Distribution Infrastructure Needs and Supply and Facilities Infrastructure Needs) - Reviewed the applicable section of the Management Review Information Package – 2023.	- None.

25.	o) Operational plan currency, content and updates - Reviewed the applicable section of the Management Review Information Package – 2023. - Review of Operational Plan in-progress. Draft update to be circulated to Top Management by May 15, 2023. - Operational Plan is required to be endorsed by Top Management and the Owner. The Operational Plan states that the Operational Plan will be re-endorsed within six months of a change to the members of Top Management. Re-endorsement of the Operational Plan did not occur as documented in the	- None.

	Operational Plan when there were changes to the members of Top Management. Since there have been no changes to the Operational Plan since it was last endorsed by Top Management, it is recommended that re-endorsement of the Operational Plan take place when the new revision is released. Top Management was in agreement that re-endorsement of the Operational Plan could take place when the new revision is released in 2023. - Re-endorsement of the Operational Plan by the owner (City of Guelph and Township of Gazer Mooney Subdivision Distribution System) will take place in Q3 2023, which meets the requirements outlined in the Operational Plan.	

26.	p) Staff suggestions - Reviewed the applicable section of the Management Review Information Package – 2023. - Staff suggestions relating to the quality management system have declined since 2019. Quality Management Specialist will review current process and ensure that staff are aware of the process for providing staff suggestions.	- Inform staff on the process for making Quality Management System staff suggestions. Assigned to Deigh Madejski, due December 31, 2023. **See CIR# 1359**.
27.	Water Efficiency Program – 2022 Annual Progress Report - There was not enough time to review this discussion item in the meeting. - The Management Review Information Package – 2023, which includes all of the information for this discussion item was provided in advance of the Management Review to all participants. An opportunity was offered for attendees to share any comments that they had on the information. No comments were raised. Meeting attendees were informed that they can forward any comments to the Quality Management Specialist (Deigh Madejski) to be properly routed and addressed. Alternatively, the Supervisor, Environmental Programs (Liana D'Andrea) can join a weekly management team meeting to answer any questions.	- None.
	- This discussion item is not a mandatory input required by the Drinking Water Quality Standard (DWQMS) for Management Review. However, it is typically included since the information relates water quality and supply.	

28.	Source Water Protection - Risk Management Official update - There was not enough time to review this discussion item in the meeting. - The Management Review Information Package – 2023, which includes all of the information for this discussion item was provided in advance of the Management Review to all participants. An opportunity was offered for attendees to share any comments that they had on the information. No comments were raised. Meeting attendees were informed that they forward any comments to the Quality Management Specialist (Deigh Madejski) to be properly routed and addressed. - This discussion item is not a mandatory input required by the Drinking Water Quality Standard (DWQMS) for Management Review. However, it is typically included since the information relates water quality and supply.	- None.
29.	Review of the action items raised in the Management Review for 2022 - Minutes were taken and will include actions raised.	- None.
30.	Next meeting dates - This item was not discussed due to meeting time constraints. (Note: although the next meeting date was not discussed, the Quality Management Specialists ensures that Management Reviews are scheduled, as required.)	- None.

Appendix B: Total Water Pumped and Instantaneous Flows

This section summarizes the total volume of treated water pumped to the distribution system as well as raw water pumped and corresponding instantaneous flows for all in-service sources in 2022.

Capacity is calculated by comparing the average pumped or flow value against the MDWL allowable volume or PTTW flow. Capacity is representative of the conditions of pumping for that year which may be influenced by other testing programs, maintenance or special operational conditions. Additionally, the actual capacity of the source may not be achievable due to well performance and/or current infrastructure. Optimization efforts are included as a component of the Water Supply Master Plan, with the intent to match the actual capacity of the water source with the appropriate infrastructure, where possible.

City of Guelph Water Services – Treated Water Pumpages, January 1, 2022 – December 31, 2022

Table 3 below shows the amount of treated water in cubic metres pumped to the distribution system from each facility in 2022.

Table 3: Treated Water Pumpages, 2022

	Facility Units Regulatory Limit	Burke m^3 6,546	Calico m^3 5,237	Dean m^3 2,300	Downey m^3 5,237	Emma m^3 3,100	Helmar m^3 3,273	Membro m^3 6,050	Paisley Net m^3 13,738)	Park m^3 10,300	Queensdale m^3 5,273	University Net m^3 5,108	Water Street m^3 3,400	F.M. Woods m^3 65,000	Total System Discharge m^3 n/a
Jan	Average	5,580	0	1,363	3,712	2,419	41	0	956	1,511	467	1,302	1,580	26,413	43,346
	Maximum	5,612	0	1,384	3,951	2,553	800	0	994	1,893	510	1,699	1,821	30,617	49,335
	Total	**172,985**	**0**	**42,261**	**115,087**	**74,996**	**1,260**	**0**	**29,622**	**46,849**	**14,480**	**40,371**	**48,995**	**818,814**	**1,405,720**
Feb	Average	5,531	0	762	3,850	2,391	0	0	965	2,032	519	1,506	1,361	27,176	45,642
	Maximum	5,570	0	1,378	3,907	2,525	0	0	1,005	5,448	852	1,594	1,835	29,833	48,177
	Total	**154,863**	**0**	**21,339**	**107,797**	**66,939**	**0**	**0**	**27,021**	**56,900**	**14,525**	**29,554**	**38,109**	**760,922**	**1,277,969**
Mar	Average	5,513	0	0	3,731	2,374	0	0	979	3,045	453	1,232	1,807	27,246	46,379
	Maximum	5,541	0	0	3,913	2,533	0	0	991	5,277	522	1,754	1,845	31,421	49,947
	Total	**170,900**	**0**	**0**	**115,670**	**73,588**	**0**	**0**	**30,337**	**94,402**	**14,030**	**38,180**	**56,008**	**844,621**	**1,437,735**
Apr	Average	5,488	0	0	3,820	1,725	0	0	942	2,093	469	505	1,669	28,059	45,477
	Maximum	5,532	0	0	3,900	2,533	0	0	992	2,696	660	1,807	1,828	30,540	48,331
	Total	**164,628**	**0**	**0**	**114,613**	**72,963**	**0**	**0**	**28,264**	**62,780**	**14,069**	**15,151**	**50,074**	**841,781**	**1,364,323**
May	Average	5,306	0	0	3,211	2,425	0	2,101	947	1,984	710	1,177	1,375	27,366	46,603
	Maximum	5,486	0	0	3,843	2,520	0	4,088	985	3,467	745	1,905	1,816	33,783	52,546
	Total	**164,493**	**0**	**0**	**99,534**	**75,185**	**0**	**65,134**	**29,370**	**61,491**	**21,998**	**36,489**	**42,635**	**848,350**	**1,444,680**
Jun	Average	5,379	0	1,081	3,516	2,494	0	2,375	806	0	508	1,511	1,480	30,198	49,347
	Maximum	5,413	0	1,403	3,833	2,566	0	3,531	956	0	737	1,884	1,688	40,068	58,361
	Total	**161,378**	**0**	**32,416**	**105,478**	**74,817**	**0**	**71,251**	**24,173**	**0**	**15,239**	**45,319**	**44,385**	**905,946**	**1,480,404**
Jul	Average	5,308	0	1,200	3,102	2,449	0	2,988	896	0	477	1,330	1,356	30,723	49,830
	Maximum	5,364	0	1,403	3,628	2,583	0	3,024	917	0	512	1,873	1,643	36,747	55,059
	Total	**164,562**	**0**	**37,187**	**96,160**	**75,932**	**0**	**93,635**	**27,781**	**0**	**14,783**	**41,232**	**42,040**	**952,406**	**1,544,718**

	Facility Units Regulatory Limit	Burke m^3 6,546	Calico m^3 5,237	Dean m^3 2,300	Downey m^3 5,237	Emma m^3 3,100	Helmar m^3 3,273	Membro m^3 6,050	Paisley Net m^3 13,738)	Park m^3 10,300	Queensdale m^3 5,273	University Net m^3 5,108	Water Street m^3 3,400	F.M. Woods m^3 65,000	Total System Discharge m^3 n/a
Aug	Average	5,055	0	1,303	3,543	2,058	0	2,719	617	0	394	1,510	1,545	26,653	48,398
	Maximum	5,564	0	1,399	3,649	2,592	0	3,024	886	0	528	1,808	1,576	36,694	55,318
	Total	**156,708**	**0**	**40,387**	**109,844**	**63,783**	**0**	**84,299**	**19,120**	**0**	**12,219**	**46,812**	**47,909**	**919,255**	**1,500,335**
Sep	Average	5,536	0	1,371	3,473	1,439	0	2,569	507	0	515	1,474	1,515	29,358	47,758
	Maximum	5,599	0	1,392	3,582	2,531	0	2,593	847	0	526	1,805	1,559	35,979	53,121
	Total	**166,087**	**0**	**41,115**	**104,175**	**43,182**	**0**	**77,073**	**15,215**	**0**	**15,454**	**44,233**	**45,460**	**880,739**	**1,432,733**
Oct	Average	5,224	0	1,388	3,470	2,461	0	215	0	0	619	1,343	1,577	29,240	45,536
	Maximum	5,613	0	1,395	3,627	2,523	0	2,592	0	0	671	1,955	1,680	37,800	53,862
	Total	**161,937**	**0**	**43,034**	**107,568**	**76,292**	**0**	**6,651**	**0**	**0**	**19,174**	**41,643**	**48,880**	**906,451**	**1,411,629**
Nov	Average	5,473	0	1,343	3,447	2,435	0	2,287	0	272	635	1,703	1,497	25,759	44,851
	Maximum	5,705	0	1,393	3,675	2,543	0	2,701	0	2,550	695	2,087	1,620	31,693	48,189
	Total	**164,186**	**0**	**40,279**	**103,410**	**73,054**	**0**	**68,598**	**0**	**8,157**	**19,061**	**51,100**	**44,899**	**772,778**	**1,345,522**
Dec	Average	5,448	0	1,390	3,273	2,416	0	2,770	0	1,768	481	1,722	1,438	22,608	43,312
	Maximum	5,496	0	1,398	3,457	2,497	0	3,024	0	4,516	501	2,198	1,463	28,557	50,165
	Total	**168,875**	**0**	**43,092**	**101,462**	**74,884**	**0**	**85,879**	**0**	**54,807**	**14,904**	**53,370**	**44,564**	**700,839**	**1,342,676**
2022 Year	Average	5,403	0	933	3,512	2,257	0	1,502	635	1,059	520	1,322	1,517	27,817	46,540
	Maximum	5,705	0	1,403	3,951	2,592	0	4,088	01,005	5,448	852	2,198	1,845	40,068	58,361
	Total	**1,971,603**	**0**	**341,110**	**1,280,798**	**845,617**	**0**	**551,521**	**230,904**	**385,386**	**189,936**	**483,452**	**553,958**	**10,152,900**	**16,988,445**
	Average Process Capacity	**83%**	**0%**	**41%**	**67%**	**75%**	**0%**	**25%**	**20%**	**10%**	**10%**	**40%**	**45%**	**43%**	**n/a**

City of Guelph Water Services – Permit-to-Take-Water Raw Pumpages, January 1, 2022 – December 31, 2022

Table 4 and Table 5 presented below, outline the Permit to Take Water Pumpages for 2022. Table 4 includes the following sources: Arkell Well 1, Arkell Well 6, Arkell Well 7, Arkell Well 8, Arkell Well 14, Arkell Well 15, Arkell Recharge Pump, Arkell Springs Glen Collector System, Burke Well, Calico Well, and Carter Well 1 and 2. Table 5 includes the following sources: Dean Well, Downey Well, Emma Well, Helmar Well, Membro Well, Paisley Well, Park Wells 1 and 2, Queensdale Well, University Well and Water Street Well.

Table 4: Permit-To-Take-Water Raw Pumpages, 2022

Facility Units		Arkell Well #1 m^3	Arkell Well #6 m^3	Arkell Well #7 m^3	Arkell Well #8 m^3	Arkell Well #14 m^3	Arkell Well #15 m^3	Arkell Wellfield (#6, 7, 8, 14, 15) Total m^3	Arkell - Recharge Pump m^3	Arkell Springs Glen Collector System m^3	Burke Well m^3	Calico Well m^3	Carter Wells #1 & #2 m^3
	Regulatory limit	**3,273**	**9,600**	**9,600**	**9,600**	**9,600**	**9,600**	**28,800**	**9,092**	**25,000**	**6,546**	**5,237**	**6,547**
Jan	**Average**	14	6,204	4,962	1,104	2,953	4,971	20,195	0	6,362	5,818	0	0
	Maximum	284	8,089	7,570	4,785	5,697	7,643	24,450	0	6,484	5,849	0	0
	Total	**420**	**192,339**	**153,814**	**34,238**	**91,552**	**154,116**	**626,059**	**0**	**197,237**	**180,372**	**0**	**0**
Feb	**Average**	14	4,276	7,506	98	3,856	5,368	21,104	0	6,162	5,773	0	0
	Maximum	295	6,904	7,638	2,308	5,633	6,453	23,849	0	6,238	5,815	0	0
	Total	**389**	**119,736**	**210,163**	**2,755**	**107,963**	**150,306**	**590,923**	**0**	**172,532**	**161,648**	**0**	**0**
Mar	**Average**	32	3,548	7,557	773	3,991	4,373	20,241	0	7,041	5,758	0	0
	Maximum	386	7,917	7,636	4,378	5,702	6,035	27,379	0	9,017	5,787	0	0
	Total	**997**	**109,977**	**234,263**	**23,957**	**123,706**	**135,565**	**627,468**	**0**	**218,266**	**178,492**	**0**	**0**
Apr	**Average**	3	3,450	7,599	96	3,354	3,607	18,106	2,422	10,047	5,738	0	0
	Maximum	100	5,604	7,633	2,270	5,581	5,499	21,089	8,446	12,443	5,775	0	0
	Total	**100**	**103,496**	**227,958**	**2,893**	**100,635**	**108,203**	**543,184**	**72,661**	**301,419**	**172,155**	**0**	**0**
May	**Average**	0	1,928	7,392	441	1,169	3,398	14,327	8,258	13,846	5,557	0	0
	Maximum	0	5,926	7,868	2,484	5,631	7,173	23,432	8,443	14,572	5,742	0	0
	Total	**0**	**59,767**	**229,140**	**13,684**	**36,230**	**105,330**	**444,151**	**255,984**	**429,228**	**172,280**	**0**	**0**
Jun	**Average**	0	2,458	7,564	472	1,762	3,868	16,124	7,877	14,888	5,637	0	0
	Maximum	0	7,806	7,781	6,364	7,401	6,469	26,238	8,056	15,103	5,669	0	0
	Total	**0**	**73,746**	**226,911**	**14,148**	**52,865**	**116,037**	**483,708**	**236,311**	**446,647**	**169,098**	**0**	**0**
	Average	0	5,049	5,699	284	2,833	4,563	18,430	3,035	12,531	5,567	0	0

	Facility Units Regulatory limit	Arkell Well #1 m³ 3,273	Arkell Well #6 m³ 9,600	Arkell Well #7 m³ 9,600	Arkell Well #8 m³ 9,600	Arkell Well #14 m³ 9,600	Arkell Well #15 m³ 9,600	Arkell Wellfield (#6, 7, 8, 14, 15) Total m³ 28,800	Arkell - Recharge Pump m³ 9,092	Arkell Springs Glen Collector System m³ 25,000	Burke Well m³ 6,546	Calico Well m³ 5,237	Carter Wells #1 & #2 m³ 6,547
Jul	**Maximum**	0	8,090	7,650	4,664	6,087	6,829	25,156	7,562	14,984	5,621	0	0
	Total	**0**	**156,533**	**176,678**	**8,817**	**87,832**	**141,457**	**571,318**	**94,081**	**388,450**	**172,576**	**0**	**0**
Aug	**Average**	0	6,021	5,097	2,788	2,592	4,778	21,275	142	8,364	5,327	0	569
	Maximum	0	8,001	7,534	6,353	6,520	7,371	28,486	4401	9,435	5,844	0	4,871
	Total	**0**	**186,642**	**157,994**	**86,425**	**80,367**	**148,103**	**65,9531**	**4401**	**259,280**	**165,130**	**0**	**17,653**
Sep	**Average**	0	7,738	3,779	925	3,135	4,642	20,219	411	7,383	5,809	0	3,805
	Maximum	0	8,080	5,473	4,369	5,261	6,532	24,427	7,750	8,296	5,869	0	4,587
	Total	**0**	**232,142**	**113,377**	**27,742**	**94,052**	**139,254**	**606,566**	**12,341**	**221,492**	**174,276**	**0**	**114,165**
Oct	**Average**	0	7,500	4,474	2,687	908	4,403	19,972	810	5,489	5,327	0	3,454
	Maximum	0	8,085	7,469	6,955	6,986	6,222	27,535	7,919	5,840	5,844	0	4,703
	Total	**0**	**232,498**	**138,697**	**83,311**	**28,133**	**136,491**	**619,131**	**25,106**	**170,171**	**165,130**	**0**	**107,071**
Nov	**Average**	0	6,232	3,484	1,739	2,537	4,463	18,455	0	5,586	5,745	0	1,836
	Maximum	0	8,357	7,507	4,138	4,948	7,411	23,090	0	6,096	5,986	0	4,122
	Total	**0**	**186,951**	**104,514**	**52,162**	**76,116**	**133,905**	**553,647**	**0**	**167,588**	**172,360**	**0**	**55,068**
Dec	**Average**	0	5,810	5,358	833	3,566	2,251	17,819	0	4,856	5,721	0	0
	Maximum	0	7,859	7,634	7,249	4,954	4,885	23,726	0	5,158	5,768	0	0
	Total	**0**	**180,111**	**166,104**	**25,827**	**110,539**	**69,796**	**552,377**	**0**	**150,549**	**177,357**	**0**	**0**
2022 Year	**Average**	5	5,018	5,872	1,020	2,721	4,224	18,856	1,913	8,546	5,648	0	805
	Maximum	386	8,357	7,868	7,249	7,401	7,643	28,486	8,446	15,103	5,986	0	4,871
	Total	**1,906**	**1,883,937**	**2,139,615**	**375,960**	**989,989**	**1,538,562**	**6,878,063**	**700,885**	**3,122,858**	**2,060,876**	**0**	**293,957**
	Average Pumped	**2%**	**52%**	**61%**	**11%**	**28%**	**44%**	**65%**	**36%**	**34%**	**86%**	**0%**	**12%**

Table 5: Permit-to-Take-Water Raw Pumpages, 2022

	Facility	Dean Well	Downey Well	Emma Well	Helmar Well	Membro Well	Paisley Well	Park Wells #1 and #2	Queensdale Well	University Well	Water Street Well
	Units	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3
	Regulatory limit	2,300	5,273	3,100	3,273	6,050	3,200	10,300	5,237	3,300	3,400
Jan	Average	1,396	3,820	2,419	40	0	956	1,496	474	1,302	1,580
	Maximum	1,442	4,063	2,553	778	0	994	1,873	571	1,699	1,821
	Total	**43,285**	**118,433**	**74,996**	**1,231**	**0**	**29,622**	**46,366**	**14,708**	**40,371**	**48,995**
Feb	Average	782	3,963	2,391	0	0	965	2,007	524	1,056	1,361
	Maximum	1,434	4,021	2,525	0	0	1,005	5,378	847	1,594	1,835
	Total	**21,888**	**110,965**	**66,939**	**0**	**0**	**27,021**	**56,191**	**14,667**	**29,554**	**38,109**
Mar	Average	2	3,841	2,374	0	0	979	3,015	462	1,232	1,807
	Maximum	63	4,028	2,533	0	0	991	5,229	572	1,754	1,845
	Total	**63**	**119,058**	**73,588**	**0**	**0**	**30,337**	**93,450**	**14,308**	**38,180**	**56,008**
Apr	Average	7	3,932	2,432	0	4	942	2,071	478	505	1,669
	Maximum	76	4,014	2,533	0	67	992	2,666	726	1,807	1,828
	Total	**76**	**117,950**	**72,963**	**0**	**112**	**28,264**	**62,135**	**14,327**	**15,150**	**50,074**
May	Average	0	3,303	2,425	0	2,061	947	1,947	713	1,162	1,375
	Maximum	9	3,952	2,520	0	3,985	985	3,427	758	1,905	1,816
	Total	**9**	**102,408**	**75,185**	**0**	**63,904**	**29,370**	**60,362**	**22,097**	**36,027**	**42,635**
Jun	Average	1,082	3,618	2,494	0	2,339	806	0	512	1,511	1,480
	Maximum	1,426	3,943	2,566	0	3,458	956	0	742	1,884	1,688
	Total	**32,452**	**108,536**	**74,817**	**0**	**70,183**	**24,171**	**0**	**15,356**	**45,319**	**44,385**
Jul	Average	1,194	3,191	2,449	0	2,942	896	0	479	1,330	1,356
	Maximum	1,423	3,733	2,583	0	2,979	917	0	571	1,873	1,643
	Total	**37,016**	**98,917**	**75,932**	**0**	**91,202**	**27,781**	**0**	**14,851**	**41,232**	**42,040**

	Facility	Dean Well	Downey Well	Emma Well	Helmar Well	Membro Well	Paisley Well	Park Wells #1 and #2	Queensdale Well	University Well	Water Street Well
	Units	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3	m^3
	Regulatory limit	2,300	5,273	3,100	3,273	6,050	3,200	10,300	5,237	3,300	3,400
Aug	Average	1,299	3,645	2,058	0	2,687	617	0	400	1,510	1,545
	Maximum	1,407	3,758	2,592	0	2,976	886	0	562	1,808	1,576
	Total	**40,263**	**112,988**	**63,783**	**0**	**83,306**	**19,119**	**0**	**12,392**	**46,812**	**47,909**
Sep	Average	1,367	3,576	1,439	0	2,543	507	0	525	1,474	1,515
	Maximum	1,415	3,690	2,531	0	2,569	847	0	587	1,805	1,559
	Total	**41,012**	**107,289**	**43,182**	**0**	**76,303**	**15,215**	**0**	**15,751**	**44,233**	**45,460**
Oct	Average	1,387	3,578	2,461	0	213	0	0	622	1,343	1,577
	Maximum	1,428	3,747	2,523	0	2,569	0	0	731	1,955	1,680
	Total	**42,993**	**110,931**	**76,292**	**0**	**6,608**	**0**	**0**	**19,290**	**41,643**	**48,880**
Nov	Average	1,343	3,553	2,435	0	2,268	0	294	642	1,703	1,497
	Maximum	1,416	3,785	2,543	0	2,677	0	2,557	726	2,087	1,620
	Total	**40,286**	**106,596**	**73,054**	**0**	**68,046**	**0**	**8,825**	**19,251**	**51,100**	**44,899**
Dec	Average	1,390	3,363	2,416	0	2,729	0	1,768	483	1,722	1,438
	Maximum	1,429	3,564	2,497	0	2,973	0	4,516	528	2,198	1,463
	Total	**43,087**	**104,260**	**74,884**	**0**	**84,602**	**0**	**54,817**	**14,968**	**53,370**	**44,564**
2021 Year	**Average**	937	3,615	2,316	3	1,482	635	1,050	526	1,321	1,517
	Maximum	1,442	4,063	2,592	778	3,985	1,005	5,378	847	2,198	1,845
	Total	**342,431**	**1,318,331**	**845,616**	**1,231**	**544,266**	**230,901**	**382,146**	**191,967**	**482,990**	**553,958**
	Average Pumped	**41%**	**69%**	**75%**	**<1%**	**25%**	**20%**	**10%**	**10%**	**40%**	**45%**

City of Guelph Water Services – Permit-to-Take-Water Instantaneous Flows, January 1, 2022 – December 31, 2022

Table 6 and Table 7 presented below, outline the Instantaneous Flow Summary for 2022. Table 6 includes the following sources: Arkell Well 1, Arkell Well 6, Arkell Well 7, Arkell Well 8, Arkell Well 14, Arkell Well 15, Arkell Recharge Pump, Arkell Springs Glen Collector System, Burke Well, Calico Well, Carter Wells 1 and 2. Table 7 includes the following sources: Dean Well, Downey Well, Emma Well, Helmar Well, Membro Well, Paisley Well, Park Wells 1 and 2, Queensdale Well, University Well and Water Street Well.

Table 6: Permit-to-Take-Water Instantaneous Flows, 2022

	Facility	Arkell Well #1	Arkell Well #6	Arkell Well #7	Arkell Well #8	Arkell Well #14	Arkell Well #15	Arkell - Recharge System	Arkell Springs Glen Collector System	Burke Well	Calico Well	Carter Wells
	Units	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s
	Regulatory limit	37.8	111.0	111.0	111.0	111.0	111.0	157.8	289.3	83.7	60.6	90.9
Jan	Average	0.2	72.2	57.4	12.8	34.2	57.5	0.0	73.6	67.3	0.0	0.0
	Maximum	13.1	95.0	91.3	88.7	95.8	92.7	0.0	77.0	68.5	0.0	0.0
Feb	Average	0.2	49.6	86.8	1.1	44.6	62.1	0.0	71.3	66.8	0.0	0.0
	Maximum	12.1	93.9	90.0	85.6	97.0	92.7	0.0	74.1	68.0	0.0	0.0
Mar	Average	0.4	41.2	87.9	8.9	46.2	50.7	0.0	81.6	66.7	0.0	0.0
	Maximum	12.8	96.1	90.7	87.6	98.0	93.6	0.0	107.4	67.9	0.0	0.0
Apr	Average	0.0	40.0	88.2	1.1	38.8	41.7	28.0	116.3	66.4	0.0	0.0
	Maximum	12.1	95.3	90.4	87.3	97.5	93.0	150.0	149.5	67.6	0.0	0.0
May	Average	0.0	22.4	85.8	5.2	13.6	39.3	95.5	153.4	64.3	0.0	0.0
	Maximum	0.0	94.8	92.7	88.3	96.9	92.2	98.1	176.6	67.6	0.0	0.0
Jun	Average	0.0	28.4	87.9	5.5	20.4	44.8	91.2	166.7	65.2	0.0	0.0
	Maximum	0.0	94.6	92.4	89.4	96.1	92.5	93.4	179.1	66.2	0.0	0.0
Jul	Average	0.0	58.7	66.0	3.3	32.8	52.8	35.2	145.0	64.4	0.0	0.0
	Maximum	0.0	95.0	90.9	87.3	95.9	90.7	89.1	177.4	66.1	0.0	0.0

	Facility	Arkell Well #1	Arkell Well #6	Arkell Well #7	Arkell Well #8	Arkell Well #14	Arkell Well #15	Arkell - Recharge System	Arkell Springs Glen Collector System	Burke Well	Calico Well	Carter Wells
	Units	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s
	Regulatory limit	37.8	111.0	111.0	111.0	111.0	111.0	157.8	289.3	83.7	60.6	90.9
Aug	Average	0.0	69.9	58.8	32.3	29.9	55.3	1.6	96.8	61.7	0.0	6.6
	Maximum	0.0	94.8	90.1	87.6	94.1	88.8	89.8	111.8	68.5	0.0	57.0
Sep	Average	0.0	89.6	43.5	10.7	36.3	53.8	4.8	62.6	67.2	0.0	44.2
	Maximum	0.0	93.6	90.4	87.1	92.8	89.1	89.9	99.8	69.5	0.0	56.8
Oct	Average	0.0	87.0	51.5	31.2	10.5	51.0	9.4	69.1	63.5	0.0	40.1
	Maximum	0.0	93.6	91.5	87.9	91.5	88.0	91.9	84.7	68.9	0.0	57.8
Nov	Average	0.0	72.1	40.2	20.1	29.4	51.6	0.0	64.6	66.4	0.0	21.3
	Maximum	0.0	93.3	90.8	88.4	94.3	102.0	0.0	71.9	68.0	0.0	57.2
Dec	Average	0.0	36.9	87.7	16.5	12.6	42.5	0.0	52.2	66.2	0.0	0.0
	Maximum	0.0	93.0	89.4	84.6	85.0	87.9	0.0	53.8	66.9	0.0	0.0

Table 7: City of Guelph - Instantaneous Flow Summary, 2022

	Facility	Dean Well	Downey Well	Emma Well	Helmar Well	Membro Well	Paisley Well	Park Wells	Queensdale Well	University Well	Water Street Well
	Units	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s
	Regulatory limit	34.6	60.6	40.8	37.8	78.0	42.0	127.2	60.6	46.2	44.4
Jan	Average	16.0	44.6	28.5	0.5	0.0	11.1	17.3	5.5	15.1	18.3
	Maximum	20.2	50.1	30.7	13.4	0.0	11.6	115.8	12.5	20.5	24.7
Feb	Average	8.9	46.3	28.2	0.0	0.0	11.2	23.2	6.1	12.2	15.8
	Maximum	19.7	50.9	30.9	0.0	0.0	12.4	116.1	13.9	19.5	29.9
Mar	Average	0.0	46.2	28.2	0.0	0.0	11.0	34.9	5.3	14.3	21.1
	Maximum	20.7	50.5	31.0	0.0	0.0	11.1	116.3	12.8	21.6	24.4
Apr	Average	0.0	46.1	28.3	0.0	0.0	10.9	23.9	5.5	5.8	19.4
	Maximum	23.3	50.0	31.8	0.0	56.0	11.8	116.0	13.1	23.6	30.8
May	Average	0.0	39.2	28.7	0.0	23.9	11.0	22.5	8.3	13.6	16.2
	Maximum	14.7	49.6	30.6	0.0	55.5	12.0	115.8	12.8	23.5	28.3
Jun	Average	13.0	42.3	29.1	0.0	27.1	9.3	0.0	5.9	17.5	17.4
	Maximum	20.0	48.9	31.1	0.0	57.0	11.8	0.0	12.5	22.6	23.5
Jul	Average	14.0	37.1	28.4	0.0	34.0	10.4	0.0	5.5	15.4	15.8
	Maximum	19.9	50.4	31.4	0.0	51.5	11.0	0.0	37.4	22.5	24.1
Aug	Average	15.1	42.3	23.9	0.0	31.1	7.1	0.0	4.6	17.5	18.0
	Maximum	28.4	45.1	32.6	0.0	50.6	10.5	0.0	16.5	21.7	22.4
Sep	Average	15.9	42.6	16.8	0.0	29.4	5.9	0.0	6.1	17.1	17.8
	Maximum	19.5	44.0	31.7	0.0	50.0	10.0	0.0	16.1	27.3	22.0

	Facility	Dean Well	Downey Well	Emma Well	Helmar Well	Membro Well	Paisley Well	Park Wells	Queensdale Well	University Well	Water Street Well
	Units	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s	L/s
	Regulatory limit	34.6	60.6	40.8	37.8	78.0	42.0	127.2	60.6	46.2	44.4
Oct	Average	16.1	41.5	28.6	0.0	2.5	0.0	0.0	7.2	15.6	18.3
	Maximum	20.0	47.3	31.3	0.0	30.2	0.0	0.0	15.8	24.4	23.1
Nov	Average	15.6	41.3	28.4	0.0	26.2	0.0	3.4	7.4	19.7	17.3
	Maximum	20.3	44.0	31.7	0.0	52.0	0.0	113.3	14.8	24.5	21.0
Dec	Average	16.3	40.3	28.6	0.0	31.5	0.0	15.8	6.1	21.9	16.9
	Maximum	19.7	41.2	30.5	0.0	32.0	0.0	112.4	11.2	26.1	18.1