Greensville Drinking Water System - Schedule C, Municipal Class Environmental Assessment

# APPENDIX E PUMPING TEST REPORT (TW2-13)



# **GREENSVILLE MUNICIPAL WELL FDG01 REPLACEMENT TW 2-13 PUMPING TEST** HAMILTON, ONTARIO

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## 1.0 INTRODUCTION

Terraprobe Inc., an Englobe company (Terraprobe), was retained by the City of Hamilton Public Works Department (City) to conduct a well assessment for a proposed municipal well, TW 2-13. The purpose and scope of the present activities are to further investigate the viability of TW2-13 for use as a municipal supply well and to support the City's efforts for completion of a Municipal Class Environmental Assessment.

There is an ongoing Environmental Assessment (EA) for the proposed upgrade of the Greensville Drinking Water System (DWS). The purpose of this investigation is to investigate the feasibility of replacement of the existing municipal well FDG-01 with a new municipal well and pump station. The City of Hamilton (City) has identified TW2-13 as a viable well for the Greensville DWS. TW2-13 is in Johnson Tew Park located north of Harvest Road between Forest Avenue and Tews Lane. TW 2-13 would serve as a replacement for the existing municipal well FDG01 located along Harvest Road. Under this methodology it is proposed to decommission FDG01 as an alternative to upgrading the existing municipal well and pumping station.

Background testing includes two previous 72-hour pumping tests, three sessions of chemical rehabilitation and ongoing water level and water quality monitoring. Background testing is summarized in the following reports:

- Hydrogeological Assessment Report, Greensville Municipal Well Backup Water Supply, Hamilton, Ontario, prepared by Stantec Consulting Ltd., dated September 2, 2014, file 160900728.
- Enhanced Well Development Results and Recommendations, completed by Lotimer & Associates Inc., dated May 2<sup>nd</sup>, 2016;
- Additional Enhanced Well Development Results, completed by Lotimer & Associates Inc., dated May 9<sup>th</sup>, 2016;
- Greensville Backup Water Supply, Hamilton Ontario, City of Hamilton, completed by SNC Lavalin, dated January 30<sup>th</sup>, 2017.

The present scope of work was based on the results of the above noted previous investigations and the proposed use for TW 2-13, a summary of findings of previous investigations listed above is provided under Section 3.1 below.





## 2.0 SCOPE OF WORK

To assess the viability of TW2-13 for use as a municipal supply well the following summary of tasks and deliverables is provided:

- *Perform a Below Grade Well Assessment and Preliminary Step Testing* A licensed well contractor will be retained to conduct a below grade well assessment for TW2-13 to indicate the integrity of the well casing and screen prior to installing a pump for further well testing. Following the below-grade well inspection a step pumping test will be completed to confirm the target rate of 90 L/min is achievable without performing chemical rehabilitation. Preliminary well inspection and step testing will implement ground water discharge plans. Based on the results of the below-grade well inspection the requirement for further rehabilitation measures was evaluated.
- **Prepare a Public Summary of Activity** A letter will be prepared for review of the City of Hamilton providing a summary of testing including timelines and provide contact information to project managers from both Englobe and City of Hamilton.
- Initiate Well Monitoring and Testing Plan A private well survey will be completed to determine locations of private wells and interviews with property owners to determine construction details and operational history for private wells in operation in the vicinity of TW2-13. A monitoring plan will be determined based on the results of the private well survey and the established network of monitoring wells established for the existing FDG01. It is expected that well monitoring will be conducted both continuously using dedicated pressure transducers (data loggers) and manually at regular intervals throughout testing. Well testing will include both baseline water quality sampling completion prior to well testing and confirmatory sampling completed upon completion of well testing. We are of the understanding that the City of Hamilton Laboratories would be used for all ground water analysis completed under the project scope.
- Complete Detailed Ground Water and Surface Water Sampling Plan A ground water monitoring plan will include the test well TW2-13 in addition selected private and on-site monitoring wells. Ground water sampling for test well TW2-13 will include full O.Reg. 169/03 sampling for parameters from Schedule 1 through 3. Selected monitoring wells will be sampled for baseline quality and at 24-hour intervals over the duration of long-term testing (four samples) for selected O.Reg. 169/03 parameters including general inorganics, metals, and microbiology.

Surface water sampling will also be completed to assess a similar range of parameters as the ground water sampling regime in addition to Microscopic Particulate Analysis (MPA), F-Specific Coliphage, Photosynthetic Pigment Bearing Algae and Diatoms (PBADs), Pharmaceuticals and Environmental Isotopes. Ground water and surface water sampling will be used to complete a GUDI analysis as discussed under the Terms of Reference.

• Completion of Hydrogeological Assessment Report – A comprehensive hydrogeological assessment report will be prepared providing the results of testing, sampling, aquifer properties, and impact assessment. The hydrogeological assessment would be completed to meet the requirements for application for a PTTW (Category 3) application. In addition to a hydrogeological assessment report, summary letters will be provided to private well owners included within the private monitoring program if applicable providing results of ground water monitoring for the private well included and results of ground water quality monitoring where applicable.

## 3.0 BACKGROUND REVIEW AND PHYSICAL SETTING

## 3.1 Location and Site Description

The test well TW 2-13 is proposed to replace the communal well FDG01 which currently services the Forest Avenue residential subdivision, consisting of approximately 36 residential properties. The existing municipal well FDG01 is located immediately north of Harvest Road, approximately 50 m east of Forest Avenue. TW 2-13 is located within Johnson Tew Park, immediately east of the Forest Ave. residential subdivision. Johnson Tew Park consists of an irregular shaped parcel of land approximately 16.9 ha (41.8 acres) in size as outlined n the attached **Figure 1**. It is proposed to replace FDG01 by installing a new pumping station and utilizing TW 2-13 as a replacement municipal supply well.

Surrounding properties to the west are municipally serviced, and properties to the east and south, including Greensville Elementary School are privately serviced. An aggregate quarry exists immediately north of the subject property, and as was previously reported aggregate extraction operations have ceased for the quarry, with the site used primarily for stockpiling and processing (SNC, 2017).

## 3.2 Summary of Previous Investigations

Previous investigations were initiated in 2013, conducted by Stantec, to determine a suitable backup well for the existing municipal well FDG01. As part of this investigation a series of three test wells were



completed, TW 1-13, TW 2-13, and TW 3-13 within the area now comprising Johnson Tew Park. Following test well drilling chemical rehabilitation of TW 2-13 commenced in 2015 to improve yield to meet the requirements for replacement of FDG01. Subsequent chemical rehabilitation was completed in 2016 and was successful in improving yields to meet quantity targets for replacement of FDG01. Following chemical rehabilitation, well testing was carried out in 2017 by SNC Lavalin in support of water taking from TW 2-13. The above reports are summarized in the following sections.

## 3.2.1 Hydrogeological Assessment – Stantec

A hydrogeological assessment was completed by Stantec in 2014 (Hydrogeological Assessment Report, Greensville Municipal Well Backup Water Supply, Hamilton, Ontario. Dated September 2<sup>nd</sup>, 2014). The purpose of the report was to provide background information pertaining to the site, outline the current demands on the municipal well (FDG01), and determine the suitability of completed test wells to meet the demands identified for FDG01. A well performance test and constant rate pumping test for TW1-13 and TW2-13, TW 3-13 was not tested due to identified low yields following completion. The following conclusions were made as part of the Stantec report:

- The report determined that water usage between 2007 and 2013 indicated that the maximum and peak hour water demands on FDG01 were 105,000 L/day and 7,560 L/hr, respectively. Production of FDG01 under the current PTTW is permitted at a maximum water taking of 197,000 L/day and 8,210 L/hr.
- A long-term, combined sustainable well yield of 95,040 L/day (66 L/min) was estimated for simultaneous pumping of TW1-13 and TW2-13. Peak short-term simultaneous pumping rates were estimated at 2,700 L/hr (45 L/min) at TW1-13 and 3,240 L/hr (54 L/min) at TW2-13.
- The extent of pumping influence was determined to be 115 m at each test well and therefore would have no impact on surrounding wells or natural heritage features.
- Water quality results from TW1-13 and TW2-13 were interpreted to have similar results between the two wells. Exceedances were observed to be present for hardness, colour, iron and turbidity. Microscopic particulate analysis (MPA) indicated that the test wells would be at a low risk of being influenced by surface water.
- It was concluded that both test wells TW1-13 and TW2-13 would be considered a viable source of groundwater taking based on limited zone of influence and water quality data.

## 3.2.2 Enhanced Well Development – Lotimer and Associates Inc.

In an effort to utilize one test well as a replacement well for FDG01, the chemical rehabilitation of TW 2-13 was undertaken to increase yields. An enhanced well development program was completed by Lotimer and Associates Inc. in August 2015 (updated 2016), as reported in the report titled: *Greensville TW2-13 Enhanced Well Development Results and Recommendations, Updated Date May*  $2^{nd}$ , 2015. The purpose of the report was to summarize the results of a downhole video inspection to determine the potential for groundwater flow through fractures in the dolostone and a enhance well by means of chemically expanding existing fractures in the bedrock. The following conclusions and recommendations were made as part of this report:

- The video inspection determined that the casing extends 12.5 meters below ground level (mbgl) and is completed within the dolostone bedrock. At 12.9 mbgl a large horizontal fracture was observed and determined to be the main source of waster production in the well. Additional smaller fractures were observed with depth but were considered to only provide small amounts of water.
- The well was pumped at 55 L/min for 20 minutes where upon completion the drawdown was observed to be 1.22 m from static. The flow rate was increased to 90 L/min and allowed to pump. After 30 minutes the pump lost suction and water was observed to enter the fracture at 12.9 mbgl.
- The well was developed with 100 L of hydrochloric acid solution (29% hydrogen chloride) followed by 100 L of clean water forcing the acid through the existing fractures. The well was then surged with compressed air and the acid solution removed from the well. Throughout the process pH was monitored. Following this the well was pumped for an additional 60 minutes to remove turbidity within the groundwater.
- A step test was completed within the well to determine the success of the well development. Upon completion it was observed that the efficiency of TW2-13 well had improved.

# 3.2.3 Additional Enhanced Well Development – Lotimer and Associates Inc.

To further improve the well yield of TW 2-13 a second chemical rehabilitation was undertaken for TW 2-13 by Lotimer and Associates Inc. in April 2016, as reported in the report titled: *Greensville TW2-13 Additional Enhanced Well Development Results and Recommendations, dated May 9<sup>th</sup>, 2016.* The purpose



of the report was to summarize the results of a second enhanced well development and video inspection to determine the if further acidification would improve groundwater yield within TW2-13. The following conclusions and recommendations were made as part of this report:

- The second round of enhanced well development was intended to break the acidification process up into the lower and upper potions of the well followed by a step test to confirm results. It was determined that the lower portion of the well would not benefit significantly from an isolated acid treatment and the entire well was acidified in the same manner as the previous test.
- The well was developed with 160 L of hydrochloric acid solution (29% hydrogen chloride) followed by 200 L of clean water forcing the acid through the existing fractures. The well was then surged with compressed air for 15 hours following which the acid solution removed from the well. Immediately after pumping the well the pH was found to be near 7. Following this the well was pumped for an additional 180 minutes to removed turbidity within the groundwater.
- A step test was completed within the well to determine the success of the well development. Upon completion it was observed that second round of acidification significantly improved the efficiency of TW2-13.

## 3.2.4 Hydrological Study – SNC Lavalin

Following the chemical rehabilitation of TW 2-13 well yield testing was undertaken by SNC Lavalin in January 2017, as summarized in the report titled: *Hydrogeological Study, Greensville Backup Water Supply, Hamilton, ON, Dated January 30<sup>th</sup>, 2017.* The purpose of this study was to conduct step testing and a 72-hour pumping test on TW2-13, complete water monitoring and sampling and evaluate the expected long-term yield for the purposes of replacing municipal well FDG01 and to assess for the potential of impacts to the surrounding area.

• Water quality analysis were submitted for all on-site wells (TW1-13, TW2-13, TW3-13 and MW101) as part of the 72-hour pumping test program. The onsite wells exceeded for E. Coli, total coliforms, lead, colour, turbidity, iron, manganese, and hardness. Additional testing for TW2-13 was completed for caffeine, MPA and F-specific coliphage. The caffeine and MPA results returned as non detectable. The F-specific results showed an increase within TW2-13 but fell below the detection limit after 24-hours, slightly increased after 48-hours and dropped after 72-hours.



- Residential water quality was collected prior to and following the pumping test. When compared to ODWS MAC standards residential water quality exceeded for E. Coli and total coliforms.
- It was determined that the long-term yield of TW2-13 was estimated to be 90 L/min (129,600 L/day) according to the available drawdowns in the well and nearby residential wells. The maximum short-term water taking rate would be 259,200 L/day.
- It was recommended to monitor surface water features, including ditches and stormwater ponds as well as surrounding residential wells on a regular basis when TW2-13 begins operating as a municipal well water supply.

## 3.3 Site Topography and Drainage

Site drainage and topography slopes towards the southern end of the property. Topographic mapping for the site and surrounding area indicates ground surface elevations between 251 to 241 metres above sea level (masl). The topography is generally gently flat lying, sloping south towards Harvest Road which lies approximately 50 m south of the site.

The site is situated within the Middle Spencer Creek sub-watershed. The main branch of Middle Spencer Creek watershed bends towards the south collecting discharge from surrounding tributaries, as well as Westover and West Spencer Creek.

Drainage from the site is primarily directed south/southeast towards Logie's Creek and Tews Falls situated approximately 650 m southeast of TW 2-13. Logie's Creek south of Tews Falls flows through the Spencer Gorge Conservation Area joining with Spencer Creek approximately 1 km southeast of TW 2-13. The Middle Spencer Creek flows south towards Webster's Falls and into Spencer Gorge.

## 3.4 Regional Geology

The subject site is situated within the physiographic region known as the Norfolk Sand Plain. The area lies between the Flamborough Plain and the Dundas Valley. Based on reviewed geologic mapping (OGS Map 2509, 1986) soils in the vicinity of the site consist primarily of glaciolacustrine deposits consisting of stratified silts and clays with sand. Soils at the subject site are comprised of coarse-textured glaciolacustrine sand and gravel with minor silt and clay soils. Overburden thickness in the area is understood to range from between 5 to 10 m followed by dolostone bedrock.



Shallow bedrock consists of dolostone of the Guelph Formation, which belongs to the Lockport Group. The Guelph formation is the uppermost unit within the Group and is comprised of a brown, medium to thick layers of dolostone. The formation is believed to have a thickness of 9 m. The Guelph Formation is considered to be the primary source of water supply for the site and surrounding privately serviced properties. Bedrock beneath the Guelph Formation consists of the Lockport Group consisting of shale deposits of the Queenston Formation.

## 3.5 Regional Hydrogeology

The regional hydrogeological conditions were assessed based on a review of the site geological conditions described above and reports previously completed by Stantec (Hydrogeological Assessment Report, Greensville Municipal Well Backup Water Supply, Hamilton, Ontario, Dated September 2<sup>nd</sup>, 2014) and SNC Lavalin (Hydrogeological Study, Greensville Backup Water Supply, Hamilton, ON, Dated January 30<sup>th</sup>, 2017). The regional hydrogeology is characterized by the following principal hydrostratigraphic units:

- <u>Overburden</u>. Surficial deposits of coarse sand and gravel with minor silt and clay are identified as the soils for the site and surrounding area. The soils are generally considered to facilitate groundwater recharge and are not considered as a viable source of groundwater for typical residential demand. Water supply wells are typically completed within underlying bedrock deposits.
- <u>Shallow Bedrock</u>. The shallow bedrock aquifer is considered to be a confined to semi confined aquifer consisting of water bearing fractured dolostone of the Guelph Formation. This unit is considered to have sharp contact with the overlying deposits and consists of numerous fractures allowing for the recharge of groundwater. The shallow bedrock aquifer represents the primary water supply aquifer for surrounding land use.
- <u>Deep Bedrock</u>. Deeper bedrock deposits consist of shale bedrock of the Queenston Formation, which is generally considered an aquitard. Groundwater within shale partings is generally of low yield and mineralized in quality. Shallow bedrock deposits are considered suitable for yield and quality, as such, water supply wells generally do not extend into deeper bedrock deposits.

Groundwater for the subject site and surrounding area is considered to flow southeast towards the Niagara Escarpment, and Spencer Gorge. With the pronounced change in topography, the gorge is expected to



receive groundwater baseflow through seeps from the bedrock face of the gorge to surface water features including Logie's and Spencer Creek and influence local groundwater flows.

Groundwater uses reported as reported within Ministry of the Environment Conservation and Parks (MECP) well records for the vicinity (500 m radius) of the site were reviewed. Groundwater wells are primarily used for and residential purposes and are situated east and south of the site, completed within limestone bedrock at depths ranging from 9 m to 30 m. It is understood that properties to the west of the site are municipally serviced by municipal well FDG01, located within the study area approximately 360 m southwest of TW 2-13.



## 4.0 RESULTS OF PRELIMINARY WELL ASSESSMENT AND STEP TEST

A well assessment and step test preliminary report was completed by Terraprobe in October 2022. The purpose of the preliminary assessment was to conduct a below grade well assessment for TW 2-13 including downhole video inspection and step test to confirm well yield for TW 2-13 and the requirement for further chemical rehabilitation based on the results of down-hole inspection and testing.

## 4.1 Results of Down-Hole Inspection

The down-hole well inspection was conducted on September 23, 2022, for TW 2-13. The inspection was completed beginning at the completed depth of the well, which was measured at a depth of 21.7 m below grade, moving up, and identified the following water bearing fracture systems. A test pump was installed within the well to drawdown water within the well to confirm elevations of water bearing fractures:

- Small fractures visible at a depth of 18.9 m, expected to produce a low yield of groundwater.
- Small fractures present at a depth of 16.4 m, which are expected to yield higher volumes than those encountered at a greater depth.
- Small fractures were present at a depth of 13.9 m yielding a low rate of groundwater.
- Fractures were present at a depth of 12.9 m which are expected to provide significant flows. The rate of flow from these fractures could not be confirmed due to the test pump obstructing camera views.
- The casing extended above depths of approximately 12 m and was observed to be in good condition.

Results of video inspection were consistent with the results of down-hole inspection completed as part of the Lotimer Inspection completed in August 2015.

## 4.2 Results of Step Testing

Preliminary testing was performed on October 13, 2022, in which TW 2-13 was pumped at three increasing discharge rates to further evaluate the sustainable yield of the well. Each rate was held constant until a stable water level was reached, rates were determined such that the cumulative rate of pumping did not exceed 50,000 L/day and are summarized as follows:



	First Step Rate	Second Step Rate	Third Step Rate
Pumping Rate	50 L/min	70 L/min	90 L/min
Duration	60 minutes	90 minutes	120 minutes
Total Volume Pumped	3,000 L	6,300 L	10,800 L
Static Pumping Water Level	11.8 m	12.2 m	12.5 m
Measured Well Drawdown	0.3 m	0.7 m	1.0 m

#### Summary of Step Pumping Test

Recovery of water levels was observed following completion of the pumping test and 95% recovery of the well was observed within 30 minutes following completion of testing. Water level monitoring results are provided in the attached **Appendix E**.

The total cumulative discharge from testing was approximately 20,100 L. Discharge from the pumping test was discharged approximately 10 m west from TW 2-13 to the grassed field, grading directed runoff to the south, and runoff was observed to infiltrate without significant ponding away from TW 2-13.

## 4.2.1 Sustainable Yield Calculations

The sustainable capacity of the well was calculated by the linear relationship of the observed drawdown at the end of each completed steps the pumping rate as shown in the graph below:



The slope of the line of best fit represents the specific capacity (discharge per unit drawdown in the well) for the on-site well was approximately 58.4 L/min/m. The specifi capacity is a measure of the efficiency of the test well. The maximum allowable capacity of the well was estimated accoring to the equaition:



## Q<sub>max</sub> = SC x s<sub>wmax</sub> x FS

Where: Q<sub>max</sub> is the estimated maximum pumping rate;

SC is the specific capacity of the well;

 $S_{wmax}$  is the maximum allowable drawdown in the well; and,

FS is a factor of safety.

The maximum allowable drawdown from the on-site well is estimated from the static water level of 11.5 m below grade and the pump setting approximately 3.0 m from the base of the well (21.8 m) and a 1.0 m submergence above the pump for an available drawdown of 6.3 m. The resulting maximum flow rate accounting for a factor of safety of 0.5 would be 184 L/min or 3.1 L/s.

Based on testing it was determined that TW 2-13 was capable of producing the required yield of 90 L/min without further chemical rehabilitation. Posting to the Environmental Activity and Sector Registry (EASR) was filed based on these results for long term testing to be completed for TW 2-13.



## 5.0 LONG TERM WELL TESTING

The following sections provide a summary of the work plan carried out as part of the 72-hour testing completed for TW 2-13.

## 5.1 Results of Private Well Survey

A public summary of monitoring and testing was prepared in conjunction with the City of Hamilton and was distributed to all properties within 500 m of testing understood to utilize private water supply wells. The private well survey was completed on October 23<sup>rd</sup>, 2022, to request permission to monitor private wells and interview residents regarding the location, construction details and operational history for private wells in operation. Well inspections were scheduled with property owners following completion of the well survey, generally in advance of well testing.

In total 38 properties were visited as part of the well survey. From the well survey letters distributed, 5 residences responded to the well survey. Of the properties from which a response to the well survey had received one well was determined to be inaccessible for the purposes of monitoring and water quality sampling throughout the duration of the pumping test. Private well monitoring was established at the remaining 4 properties. The well survey letter and pumping test notification letter are provided in **Appendix A**. A summary of the survey results is provided in the attached **Table 1**.

## 5.2 Well Monitoring Program

Based on the results of the well survey, private well monitoring and sampling locations were established prior to the start of well testing where permission was granted by property owners and wells were accessible. A record of manual water level measurements is provided in the attached **Table 2** and **Table 3** with hydrographs showing ground water levels in relation to water levels within TW2-13 are provided within the attached **Appendix B**. The following provides a summary of both on-site and off-site locations monitored as part of the current investigation.

## 5.2.1 On-Site Monitoring Locations

On-site monitoring locations, within Johnson Tew Park, included three 150 mm diameter wells, TW1-13, TW2-13 and TW3-13, and one 50 mm diameter monitoring well, MW101. The following table provides a summary of the on-site test and monitoring well:

## Summary of On-Site Monitoring Locations



Well ID	Approximate	nate Well Depth		Well Screen Details
	Ground	(mbgl) (masl)		
	Elevation (masl)			
TW1-13	248.92	23.45	225.77	Open Hole (bedrock) 13.72 to 23.15 m depth
TW2-13	243.76	21.67	222.09	Open Hole (bedrock) 12.50 to 21.67 m depth
TW3-13	246.10	26.34	219.76	Open Hole (bedrock) 14.63 to 26.34 m depth
MW101	243.76	10.70	233.06	No. 10 Slot (overburden) 29.0 to 33.5 m depth

Monitoring well MW-101 was previously installed at the site as part of the hydrogeological investigation completed by SNC Lavalin (2016). Monitoring well MW-101 was completed and screened at the base of overburden deposits and is located approximately 5 m north of TW2-13. Test wells TW 1-13, TW 2-13, and TW 3-13 were installed as part of the Stantec hydrogeological investigation (2014), TW 1-13 is situated approximately 150 m north of TW 2-13 and TW 3-13 is located 90 m south of TW 2-13. The above monitoring wells are continuously monitored as part of the City of Hamilton network of monitoring wells, at a monitoring frequency of 10 minutes.

## 5.2.2 Off-Site Monitoring Locations

Private monitoring well locations were established at locations where permission was granted by the resident and where wells were accessible. Private monitoring wells were included based on the response to the completed private well survey and response received from the provided notification of pumping test distributed one week prior to completion of the pumping test. Well tags and MECP well ID information was not present in the field and could not be confirmed during completed well inspections. Detailed stratigraphy for private monitoring well locations was not known and MECP well records were not correlated to private monitoring locations. Correlation between wells included within the private well monitoring program and the MECP well record database could not be completed due to the degree of error with georeferencing associated with well records.

Based on the well survey data and stratigraphy information within MECP well records it is expected that private wells are completed within the dolostone bedrock. The following table provides details of well locations monitored during the completed well testing:



Monitoring Location	Easting	Northing	Ground Elevation	Depth		Depth Groundwater Level (Dec 12 <sup>th</sup> , 2022)		Distance to TW2-13 (m)
				(mbgl)	(masl)	(mbgl)	(masl)	
63 Tews Lane	582457	4793080	247	28.00	219.00	14.20	232.8	200
3 Medwin Drive	582720	4792675	236	19.00	217.00	6.3	229.7	350
15 Medwin Drive	582521	4792683	241	18.30	222.70	13.21*	227.99	250
609 Harvest Rd	582567	4792673	239	17.10	222.9	10.48	228.52	300

#### **Summary of Monitoring Well Locations**

\*Water levels taken after testing commenced due to a lack of access to well.

All the above noted monitoring locations were equipped with pressure transducers set to record continuous water levels at 10-minute intervals. This information was supplemented with regular manual water level measurements over the duration of testing. Locations of all on-site and off-site monitoring wells are provided on the attached **Figure 2**. The results of groundwater level monitoring are further discussed in Section 4 below.

## 5.3 Water Quality Sampling Program and Schedule

Groundwater monitoring was completed for all on-site and off-site wells included within the monitoring program, in addition to surface water sampling at Tews Falls approximately 650 m southeast from TW 2-13. The following table provides a summary of groundwater and surface water sampling locations, the frequency of sampling and parameters sampled over the duration of long-term testing at TW 2-13.

On-Site Monitoring Wells		
TW 1-13	December 12, 2022	O.Reg. 169/03 partial sampling, field parameters (daily)
	December 15, 2022	As above
	January 10, 2023	O.Reg. 169/03 partial sampling with dissolved metals
TW 2-13	December 12, 2022	O.Reg. 169/03 partial sampling, caffeine, field parameters
		(hourly), microscopic particulate analysis (MPA), F-coliphage
	December 13, 2022	O.Reg. 169/03 partial sampling
	December 14, 2022	As above
	December 15, 2022	O.Reg. 169/03 full sampling, caffeine, microcystins, field
		parameters, age dating, microscopic particulate analysis (MPA),
		F-coliphage
	January 17, 2023	O.Reg. 169/03 partial sampling with dissolved metals
TW 3-13	December 12, 2022	O.Reg. 169/03 partial sampling, field parameters (daily)
	December 15, 2022	As above
	January 10, 2023	O.Reg. 169/03 partial sampling with dissolved metals
MW101	December 12, 2022	O.Reg. 169/03 partial sampling, caffeine, field parameters
	December 15, 2022	O.Reg. 169/03 partial sampling, field parameters
	January 10, 2023	O.Reg. 169/03 partial sampling with dissolved metals
Off-Site Monitoring Wells	_	
FDG01	December 15, 2022	O.Reg. 169/03 partial sampling
63 Tews Lane	December 1, 2022	O.Reg. 169/03 partial sampling
	December 15, 2022	As above, with field parameters
	May 16, 2023	O.Reg. 169/03 partial sampling
3 Medwin Drive	December 1, 2022	O.Reg. 169/03 partial sampling

#### **Summary of Water Sampling Program**



	December 15, 2022	As above, with field parameters
15 Medwin Drive	December 12, 2022	O.Reg. 169/03 partial sampling
	December 15, 2022	As above, field parameters
609 Harvest Road	December 12, 2022	O.Reg. 169/03 partial sampling
	December 15, 2022	As above, with field parameters
Surface Water Location		
Logie's Creek @ Tews Falls	December 13, 2022	O.Reg. 169/03 partial sampling, F-coliphage
	December 15, 2022	As Above, with age dating

Sampling for partial parameters of O.Reg. 169/03 included total metals (dissolved metals analysis included where specified), inorganics and organics (partial Schedule 2), and microbiology (Schedule 1). Sampling for full parameters of O.Reg. 169/03 included full Schedule 1 and Schedule 2 sampling, and gross alpha and gross beta particle analysis under Schedule 3. Field parameters were measured in field using a Horiba U 52 sampling unit, office calibrated prior to use. Details regarding the Horiba U 52 sampling unit are provided in **Appendix F**. Field parameter included temperature, pH, oxidation reduction potential, conductivity, turbidity, dissolved oxygen and total dissolved solids. Results of groundwater and surface water sampling are provided in Section 6.6 below.



## 6.0 SUMMARY OF AQUIFER PERFORMANCE TEST

## 6.1 Summary of Pumping Test

Well testing occurred between the dates of December 12<sup>th</sup> and 15<sup>th</sup> 2022 as summarized below:

#### **Summary of Well Testing**

Time Started	December 12 <sup>th</sup> @ 4:30 pm
Available Drawdown at Start of Testing	10.6 m
Pumping Rate	90 L/min (129,600 L/day)
Maximum Observed Drawdown	1.0 m
Available Drawdown at End of Testing	9.6 m
Time Completed	December 15 <sup>th</sup> @ 4:30 pm
Total Test Duration	4,320 mins (72 hours)
Volume Pumped	388,800 L

Total drawdown over the duration of testing was measured at 1.0 m which was calculated to correlate to the use of approximately 15 % of the expected available drawdown available within TW2-13 based on the completed depth of the well (i.e., observed drawdown of 1.0 m divided by total available drawdown of 10.4 m less a 1.0 m pump depth, and having the pump raised 3.0 m from the base of the well).

## 6.2 Groundwater Discharge

Discharge from the pumping test was directed overland approximately 30 m west of TW2-13 to the western limit of Johnson Tew Park, which sloped south away from TW 2-13. The discharge location was grassed and was inspected regularly throughout pumping to confirm ponding water and erosion was minimized. Groundwater discharge was not observed to impact adjacent properties and infiltrated within shallow soils.

## 6.3 Summary of Precipitation Events

The table below summarizes the observed precipitation over the duration of testing from the nearest weather station (Hamilton RBG located approximately 6.8 km from the site at the Royal Botanical Gardens):



Date	Precipitation (mm)
December 12 <sup>th</sup>	Trace
December 13 <sup>th</sup>	No Precipitation Recorded
December 14 <sup>th</sup>	Trace
December 15 <sup>th</sup>	20.0 mm

#### Summary of Recorded Precipitation during Well Testing

Trace rain was recorded in the area December 12<sup>th</sup> and 14<sup>th</sup>. A short duration high intensity rainfall event was noted on December 15<sup>th</sup>, 2022. The rainfall events were not observed and are not expected to have impacted the results of the pumping test given the depth of the test well and that rainfall was not observed to accumulate around the base of TW2-13. There was no accumulated snowpack at the time of testing, snowfall was not recorded over the duration of testing.

## 6.4 Test Well Recovery

Recovery in the pumping well was monitored following the completion of the pumping test both manually and through installed pressure transducers set to record water levels at 10-minute intervals. Water levels in TW2-13 were observed to have recovered to 95% of the measured static water level prior within 1.5 hours following the completion of the pumping test.

Hydrographs from continuous and manual monitoring of TW 2-13 prior to the start, over the duration of the 72-hour testing, and following completion of testing is provided in the attached **Appendix B** with manual water level measurements in attached **Table 2 and 3**.

## 6.5 Results of Well Monitoring Program

## 6.5.1 On-Site Monitoring Wells

On-site water levels were monitored within on-site wells TW1-13, TW3-13 and MW-101. Below is a table summarizing well construction, distance from the pumping well, and observed drawdown during testing:

Well ID	Distance from Pumping Well (m)	Well Depth (mbgl)	Material Well is Completed Within	Static Water Level Prior to Pumping Test (mbgl)	Available Drawdown (m)	Observed Drawdown (m)
TW1-13	150	23.15	Dolostone	15.32	7.83	0.7
TW3-13	90	26.34	Dolostone	12.63	13.71	0.3
MW-101	5	10.60	Overburden	8.68	14.47	0.01

#### Summary of On-Site Well Monitoring



Impacts to ground water levels were not observed within MW 101. Groundwater fluctuations within TW 1-13 and TW 3-13 were attributed to testing completed at TW2-13, and these locations were used in assessing the drawdown potential for water taking at TW 2-13, further discussed in Section 7.2 below.

## 6.5.2 Off-Site Monitoring Wells

Off-site monitoring wells were monitored using dedicated pressure transducers set to record water levels at 10-minute intervals. Manual groundwater levels were also collected throughout the duration of testing to verify potential impacts due to water taking and to correlate with continuous monitoring data from each location. The results of off-site well monitoring are further detailed in the following table:

Well Location	Distance from Pumping Well (m)	Well Depth (mbgl)	Static Water Level Prior to Pumping Test (mbgl)	Available Drawdown (m)	Observed Drawdown (m)
63 Tews Ln	200	28.0	14.2	13.8	0.5
3 Medwin Dr	400	19.0	6.3	12.7	0.1
15 Medwin Dr	300	18.3	13.0	5.3	0.0
609 Harvest Rd	250	17.1	10.5	6.6	0.0

## Summary of Off-Site Well Monitoring

Impacts to ground water levels were not observed within private wells located at 3 Medwin Drive, 15 Medwin Drive and 609 Harvest Road. Observed groundwater fluctuations at these locations were attributed to residential well use, fluctuations in groundwater were not observed to correlate with groundwater fluctuations observed within TW 2-13.

Groundwater fluctuations within the private wells located at 63 Tews Lane were attributed to testing completed at TW2-13, and this location was used in assessing the drawdown potential for water taking at TW 2-13. Measured drawdown within the private well at 63 Tews Lane accounted for approximately 5 % of available drawdown (assuming a submersible pump located 3.0 m off the base of the well with a 1.0 m submergence). Groundwater changes in the private well at 63 Tews Lane as a result in testing completed for TW 2-13 were not considered significant.

Complaints due to impacts as a result of well testing were not received by Terraprobe or from the MECP over the duration of or following completion of well testing.

## 6.6 Summary of Water Quality Analysis

The following section provides a summary of water sampling completed as summarized in the table provided in Section 5.3 above.



## 6.6.1 O.Reg. 169/03 Sampling Results

## 6.6.1.1 Pumping Well TW 2-13

Groundwater sampling was conducted from the point of discharge from TW2-13 daily beginning at the start of testing on December 12, 2022, to immediately prior to the end of sampling on December 15, 2022. Additional groundwater quality samples were obtained on January 17, 2023, using a submersible pump, for further comparison with sampling completed during testing and to further evaluate total and dissolved metals parameters within groundwater.

Groundwater from TW 2-13 is characterized by high levels of hardness and total dissolved solids including calcium carbonates as a result of the limestone source aquifer. Health related parameters of O.Reg. 169/03 were observed within guideline limits over the duration of testing. Groundwater quality was not observed to degrade with pumping, parameters including turbidity, colour and iron improved with water taking, total metals concentrations and hardness remained consistent. Nitrate was observed to increase from 1.4 mg/L to 3.2 mg/L over the duration of testing but remained well within acceptable limits (health related limit of 10 mg/L), groundwater sampling from TW 2-13 completed on January 17, 2023 indicate nitrate concentrations of 1.36 mg/L. Organic, herbicide, and pesticides within Schedule 2 of O.Reg. 169/03 and gross alpha and gross beta particles within Schedule 3 were not detected within samples collected at the end of testing. A summary of the results of analysis for TW 2-13 for O.Reg. 169/03 parameters is provided in the attached **Table 4**, and certificates of analysis are provided in **Appendix C**.

## 6.6.1.2 On-Site Monitoring Wells

Groundwater sampling was completed directly from the well using a submersible pump for TW1-13, and TW3-13 and from MW101 using a disposable bailer. Sampling was prior to the start of testing on December 12, 2022, and upon completion of the pumping test on December 15, 2022. Additional sampling was completed on January 10, 2022, for further comparison with sampling completed during testing and to further evaluate total and dissolved metals parameters within groundwater.

Monitoring wells TW 1-13 and TW 3-13 were pumped using a submersible pump to purge standing water prior to sampling on December 12, 2022, and using the same submersible pump on December 15, 2022. Pumping these wells resulted in high levels of turbidity, colour, and total suspended solids. High levels of total suspended solids also resulted in high levels of total metals within the collected samples. Total metals exceedances included aluminium, arsenic, barium, chromium, iron, lead, manganese, and zinc were observed to have elevated suspended sediment loads,



Due to high levels of total metals observed within collected samples these wells were resampled on January 10, 2023 and sampled for both total and dissolved metals to determine metals concentrations dissolved within groundwater. Within the samples collected on January 10, 2022, only total iron concentrations were observed in exceedance of O.Reg. 169/03, dissolved metals were observed within guideline limits.

Groundwater quality within on-site monitoring wells was observed to have high levels of hardness, turbidity, colour, and iron, characteristic of the bedrock aquifer. Coliform bacteria were also detected within on-site monitoring wells. These exceedances are attributed to monitoring wells being used as observation wells and have not been actively pumped. These wells are proposed to form part of the network of monitoring wells in use by the City of Hamilton and are not proposed for water taking.

Organic parameters listed within Schedule 2 of O.Reg. 169/03 were not detected within groundwater sampled from on-site monitoring wells. Groundwater monitoring did not indicate increasing trends over the duration of testing. Nitrate levels within TW 1-13 and TW 3-13 were not detected, and nitrate levels within MW 101 did not exceed 1.1 mg/L. On-site water quality is summarized in the attached **Table 4**. Laboratory certificates of analysis are provided in the attached **Appendix C**.

## 6.6.2 Surface Water and Off-Site Monitoring Wells

## 6.6.2.1 Surface Water – Tews Falls

Surface water was collected from Tews Falls December 13<sup>th</sup> and 15<sup>th</sup>, 2022 to characterize surface water quality with respected to groundwater sampling conducted as part of the investigation. Surface water sampling was completed along Logie's Creek upstream of Tews Falls approximately 700 m southeast of TW 2-13.

Surface water sampling showed elevated levels of hardness, colour, turbidity and total suspended solids. High concentrations of total suspended solids corresponded with elevated levels of total metals for aluminium, iron, lead and manganese. Surface water was characterized by high levels of both e-coli and total coliform bacteria. A summary of surface water sampling results for O.Reg. 169/03 parameters is provided in the attached **Table 4**, and certificates of analysis are provided in **Appendix C**.

## 6.6.2.2 Greensville Municipal Well FDG 01

A groundwater sampling was completed for the Greensville municipal well FDG01 on December 15<sup>th</sup>, 2022 prior to the completion of testing for comparison to sampled groundwater quality for both the



pumping wells and the series on monitoring wells used for the investigation. FGD01 was sampled for Schedule 1 and partial parameters listed within Schedule 2 of O.Reg. 169/03. Groundwater quality results indicated elevated hardness levels representative of the bedrock aquifer of which FDG01 is screened. Health related parameters of sampled O.Reg. 169/03 parameters were all within guideline limits. Bacteria, including e-coli and total coliforms, in addition to sampled organic parameters were not detected within the collected sample. A summary of O.Reg. 169/03 sampling for FDG is provided in **Table 4**, certificates of analysis are provided in **Appendix C**.

## 6.6.2.3 Private Residential Monitoring Wells

Groundwater samples were collected from residential properties of 3 and 15 Medwin Drive, 63 Tews Lane and 609 Harvest Road. Samples were collected prior to the start of the pumping test on either December 1<sup>st</sup> or December 12<sup>th</sup>, 2022, and shortly before the completion of the pumping test on December 15, 2022. Groundwater analysis was completed to assess the potential for changes in groundwater quality with pumping from TW 2-13. Water was collected Groundwater samples were collected directly from the well using a bailer from 63 Tews Lane, and 15 Medwin Drive, or from an outdoor tap which bypasses any treatment 3 Medwin Drive and 609 Harvest Road.

Collected groundwater samples were characterized by high levels of hardness, colour, turbidity, total iron, and total manganese. These parameters are considered representative of the bedrock aquifer. High total iron and manganese concentrations were attributed to the oxidation of the steel well casing since groundwater samples from private residential wells were obtained from untreated source, and water taking fluctuations within private wells is expected to have resulted in heavy oxidation of casing material.

Total coliform bacteria were also detected within collected samples, which was attributed to collection of samples from within the well casing using a bailer, or within the distribution system, and is not considered characteristic of the bedrock supply aquifer. Nitrate concentrations within private water supply wells ranged from non-detect to 1.7 mg/L. Organic parameters included under O.Reg. 169/03 were not detected in completed sampling for private residential wells.

Groundwater sampling completed at 63 Tews Lane indicated high concentrations of total metals including aluminium, arsenic, iron, and manganese. These concentrations of total metals were attributed to be due to sampling methodology using a disposable bailer to obtain a shallow sample directly from the well casing. Resampling was completed at the property May 16, 2023, using a submersible test pump drawing groundwater from above the installed pump to obtain a sample considered representative of groundwater used for the residence. Results of water quality sampling completed on May 16, 2023, indicated all



health-related parameters were within acceptable limits. A summary of all off-site groundwater sampling results is provided in the attached **Table 5**. Laboratory certificates of analysis are provided in the attached **Appendix C**.

## 6.6.3 Sumary of Groundwater Field Quality Analysis

Field analysis was completed from TW 2-13 (hourly), TW 1-13, TW 3-13 (daily) MW 101 (December 12 and 15) and from private residential monitoring wells (December 15). Field parameters were measured in field using a Horiba U 52 sampling unit, office calibrated prior to use. Field parameter included temperature, pH, oxidation reduction potential, conductivity, turbidity, dissolved oxygen and total dissolved solids. A summary of measured field values are provided in the attached **Table 6**.

Sampled field parameters within TW 2-13 were observed to remain consistent over the duration of monitoring. Field sampled parameters were consistent between monitoring locations and with the results of laboratory analysis. Average field parameter values are summarized in the following table:

Location	Temp (°C)	рН	ORP (mV)	Conductivity (ms/cm)	Turbidity (NTU)	DO (mg/L)	TDS (mg/L)
TW 2-13	5.8	7.2	132	1.1	0	14.1	0.7
TW 1-13	7.8	7.7	78	0.7	29	5.9	0.5
TW 3-13	8.5	7.5	77	2.5	14	3.1	0.5
MW 101	8.4	7.3	45	0.6	61	8.4	0.4
3 Medwin	9.2	7.2	86	1.0	0	6.0	0.6
15 Medwin	13.2	7.1	105	1.0	0	5.1	0.7
609 Harvest	8.2	7.4	121	1.2	0	7.9	0.6
63 Tews	7.0	7.4	111	0.9	9	5.2	0.6

Summary of Average Field Sampling Parameters

ORP – Oxidation Reduction Potential

DO – Dissolved Oxygen

TDS – Total Dissolved Solids

## 6.6.4 Summary of Microscopic Particulate Analysis Sampling

Sampling was completed for microscopic particulate analysis (MPA), including coliphages from TW 2-13 following 24, 48, and 72 hours of elapsed pumping, and for coliphages from surface water along Logie's Creek at Tew falls after 24 hours of pumping. Analysis indicated no observable microscopic particulate within obtained groundwater samples and no observable coliphages within surface water at the sampled intervals. Certificates of analysis for completed MPA testing is provided in **Appendix D**.

## 6.6.5 Summary Age Dating Analysis

Age dating analysis was carried out for TW 2-13, FDG01, and for surface water within Logie's Creek at Tews Falls on December 15, 2022. Age dating testing verified the presence of deuterium (H<sup>2</sup>) isotopes



and oxygen  $O^{18}$  isotopes. Evaporation and precipitation will deplete levels of  $O^{18}$  isotopes, given that they are heavier than  $O^{16}$  isotopes. Surface water is expected to have lower concentrations of  $O^{18}$  relative to older groundwater sources. Based on the results of sampling surface water was observed to have  $O^{18}$ ratios of -8.6% relative to the standard meteoric line and ratios of -10.3 % of  $O^{18}$  relative to the standard meteoric line within groundwater. Rations of H<sup>2</sup> were also observed to have variation between surface water and groundwater sources, with surface water ratios for H<sup>2</sup> of -59.1% relative to the standard meteoric line and ratios of -67.5 % of H<sup>2</sup> relative to the standard meteoric line within groundwater. Surface water would be derived by precipitation more so than groundwater sources.

When ratios of  $H^2$  and  $O^{18}$  are plotted with the global meteoric line, which describes the global annual average relationship between  $O^{18}$  and  $H^2$  isotopes ratios in water both surface and groundwater fall within reasonable limits of the trendline. Based on the completed age dating analysis surface water has a slightly younger age based on the observed ratios of  $H^2$  and  $O^{18}$  molecules. Age dating analysis and trendline potting is provided in **Appendix G**.



## 7.0 DISCUSSION AND ANALYSIS

## 7.1 Site Hydrogeological Function

The current hydrogeological function of the site was evaluated to assess the potential areas of hydrogeological impact as a result of development of the site. The following conditions were noted:

- Surficial overburden deposits across the site consist of glaciolacustrine deposits comprised of coarse sands and gravel trace silt and clay.
- Surficial deposits overlie dolostone bedrock of the Guelph Formation. Shallow bedrock is characterized to be fractured and will be water bearing. Shallow bedrock of the Guelph Formation is underlain by shale bedrock of the Queenston Formation.
- The Guelph Formation is reported as a brown dolostone. It is expected that water quality within the Guelph Formation will be mineralized with varying concentrations of hardness, carbonate, sodium, iron, and manganese. TW 2-13, along with wells included within the network of monitoring wells used for this investigation are completed within limestone bedrock.
- Within the vicinity of the site the primary water supply aquifer is the dolostone bedrock. Wells in the vicinity of the site are generally completed to a depth of approximately 30 to 60 m.
- Groundwater flow within overburden and within shallow bedrock for the area has been confirmed to the south.
- It is expected that the site functions to provide groundwater recharge for the underlying dolostone bedrock. Areas of groundwater discharge were not observed across the site or for the surrounding vicinity. Groundwater discharge from within bedrock is expected along the face of the Niagara Escarpment south of the site.
- Surface water features in the immediate vicinity include Logie's Creek and Tew Falls. It is expected that overburden in the area generally allows for the recharge of groundwater across the site.

## 7.2 Drawdown Assessment

Potential drawdown due to water taking was assessed based on the results of pumping. Groundwater levels measurements completed within the pumping and monitoring well network indicated drawdown attributed to the pumping test at monitoring locations TW 1-13, TW 3-13 and 63 Tews Lane. The following summarizes the distance vs. drawdown observed for water taking:

Location	Distance from Pumping Well (m)	Observed Drawdown (m)
TW 2-13	0	1.0
TW 3-13	90 (south)	0.3
TW 1-13	150 (north)	0.7
63 Tews Lane	200 (northeast)	0.5

#### Summary of Distance vs. Drawdown

Given that TW 2-13 is screened within bedrock drawdown will be dependent on the location and orientation of water bearing fractures. Drawdown with distance from TW 2-13 was not observed to have a direct correlation. Based on the observed drawdown it is expected that fractures trend in a southwest to northeast orientation. The private well at 63 Tews Lane represents the closest private well included within the monitoring program. The remaining private residential wells monitored ranged in distance from 250 m to 400 m east of TW 2-13. Impacts of water taking were not observed within these private residential monitoring wells.

The results of testing at TW 2-13 were analyzed to assess aquifer properties including hydraulic conductivity, transmissivity, and storativity. The aquifer response to both groundwater drawdown and recovery were plotted to assess aquifer properties following a Cooper, Jacob analysis methodology. Drawdown analysis is provided in **Appendix H**, including semi-log plots used in determining storage coefficients based on the following equation:

## $S = 2.25Tt_o/r^2$

Where: S is the storage coefficient

T is transmissivity (m<sup>2</sup>/sec)

- to is the semi-log intersect where zero drawdown crosses the time axis (min)
- $\boldsymbol{r}$  is the radial distance from the pumping well (m)

The following table provides a summary of the results of aquifer analysis:



Location	Distance from Pumping Well (m)	Hydraulic Conductivity (m/sec)	Transmissivity (m <sup>2</sup> /sec)	Storage Coefficient
TW 2-13 (Drawdown)	0	2.3 x 10 <sup>-4</sup>	2.2 x 10 <sup>-3</sup>	5.3 x 10 <sup>-4</sup>
TW 2-13 (Recovery)	0	2.3 x 10 <sup>-4</sup>	2.1 x 10 <sup>-3</sup>	5.2 x 10 <sup>-4</sup>
TW 3-13	90	1.7 x 10 <sup>-4</sup>	2.3 x 10 <sup>-3</sup>	2.6 x 10 <sup>-5</sup>
TW 1-13	150	1.3 x 10 <sup>-4</sup>	1.2 x 10 <sup>-3</sup>	7.0 x 10 <sup>-4</sup>
63 Tews Lane	200	1.1 x 10 <sup>-4</sup>	1.5 x 10 <sup>-3</sup>	8.4 x 10 <sup>-4</sup>
Average Values		1.7 x 10 <sup>-4</sup>	1.9 x 10 <sup>-3</sup>	5.2 x 10 <sup>-4</sup>

## Summary of Aquifer Properties from Testing (TW 2-13)

Based on the above aquifer long term yield given the assumed 20-year pumping period. The seasonal low groundwater conditions were assumed from the SNC Lavalin investigation at 11.97 m below grade which is considered consistent with the static groundwater level measured at 11.85 m on September 23, 2022, and the average aquifer properties summarized above.

Parameters	Unit/Formula	Values	
Time (t)	Year	20	
	Day		7300
Transmissivity (T)	m²/sec	1.9 x 10 <sup>-3</sup>	
	m²/day	164.2	
Maximum Available	m	1.68	
Drawdown (h₀-h)			
Radius of Well Screen (r)	m	0.076	
Storage Coefficient (s)	Unitless	5.2 x 10 <sup>-4</sup>	
Constant (u)	$u = sr^2/4Tt$	Unitless	5.4 x 10⁻ <sup>8</sup>
Well Function of u [W(u)]	-0.5772 – In(u)	Unitless	16.2
Long-Term Yield (Q <sub>20</sub> )	$Q_{20} = 4\pi T(h_0-h)/W(u)$	m³/day	214
Theis		L/min	149
Long-Term Yield (Q <sub>20</sub> )	$Q_{20} = 0.068T(h_0-h) \times 0.7$	m <sup>3</sup> /day	131
Farvolden		L/min	91

#### Summary of Long-Term Yield Analysis

Given the above analysis it is expected that the target yield for TW 2-13 of 90 L/min is expected to be sustainable over the long-term.

## 7.3 GUDI Analysis

An assessment was completed for TW 2-13 to assess the potential that TW 2-13 yield groundwater under the direct influence of surface water (GUDI). The assessment was conducted in accordance with the MECP guidance document titled *Terms of Reference for Hydrogeological Studies to Examine Groundwater Sources Potentially Under Direct Influence of Surface Water (MOECC, 2001).* The terms of reference followed a multi criteria approach, with the criteria provided below followed by the completed assessment.



## 7.3.1 Physical Evidence of Surface Contamination

Physical evidence of surface water contamination in groundwater includes high rates of turbidity, or visible plant or insect matter. Field and laboratory concentrations of turbidity in discharge water remained consistently low. Turbidity was not detected within field sampling completed on a hourly basis over the duration of testing. Laboratory analysis indicated initial concentrations of 6.8 NTU, likely attributed to sediment from the base of the well disturbed with test well installation and the start of testing. Subsequent sampling steadily improved from 0.47 NTU to 0.26 NTU. Physical evidence of surface contamination was not observed during the completion of microscopic particulate analysis. This criterion was not met under the completed GUDI analysis.

## 7.3.2 Microscopic Particulate Analysis

Microscopic Particulate Analysis (MPA) was carried out after 24 hours, 48 hours and 78 hours of elapsed pumping. Completed MPA analysis did not detect any microscopic particulate within collected samples. Groundwater is considered to not have come in direct contact with sources of microscopic particulate such as surface water. Coliphage was also not detected within groundwater samples collected as part of the MPA analysis. This criterion was not met under the completed GUDI analysis.

## 7.3.3 Bacterial Contamination of Groundwater

Laboratory analysis of groundwater discharge from TW 2-13 was completed over five sampling events. Bacteria including e-coli and total coliforms were not detected within any of the collected samples. Surface water samples indicated total coliform counts ranging from 1,960 to 3,650 colony forming units (CFU) per 100 mL, with e-coli counts ranging from 10 to 20 CFU per 100 mL. Given the above bacterial sampling results this criterion was not met under the completed GUDI analysis.

## 7.3.4 Well Characteristics and Groundwater Quality

Test well TW 2-13 was completed as a bedrock well as noted within the well record completed as part of well installation. TW 2-13 is located approximately 600 m northwest of Logie's Creek. Other surface water features include a pond within the former quarry site situated approximately 490 m north of TW 2-13 and the drainage channel (historically known as the railway cut) connecting the quarry pond with Logie's Creek located approximately 450 m northeast of TW 2-13. Surface water is located within 500 m of the pumping well TW 2-13.



Water taking was observed to have negligible impact on the overburden monitoring well MW 101 over the duration of water taking. MW 101 is situated approximately 5 m from the pumping well TW 2-13. Water taking from TW 2-13 is not expected to influence shallow groundwater within overburden deposits or overlying surface water features.

TW 2-13 is cased through overburden deposits with the significant water bearing fracture identified at a depth of approximately 12.9 m below grade. It is expected that the bedrock aquifer can be classified as a confined to semi-confined aquifer with limited surface water interaction. Surface water was not monitored as part of the investigation, however, given the negligible response observed within MW 101 it is expected that water taking will not impact vertical gradients recharging the bedrock aquifer, potentially influencing surface water features.

Field testing over the duration of testing indicated an average value of 5.8 °C, with an average dissolved oxygen content of 14.1 mg/L. Given the ambient temperature of December, the average temperature of groundwater was representative of a groundwater source. Given the above considerations this criterion was not met under the completed GUDI analysis.

Under the above completed GUDI analysis and considering the results of completed age dating, indicating surface water is derived from precipitation and was observed to have a different O<sup>18</sup> and H<sup>2</sup> ratio when compared to groundwater, TW 2-13 should not be considered as a GUDI source. Groundwater is expected to be geologically isolated from surface water features.

## 7.4 Water Taking Impact Analysis

The following sections provide a summary of the potential impacts of water taking to surrounding features including groundwater uses in he vicinity of the site, and natural features. The potential for groundwater quality impacts was assessed based on the completed testing and analysis summarized in the above sections.

## 7.4.1 Impacts to Private Supply Wells

Given that the test rate is considered sustainable over the long term, the observed drawdown rates within monitoring wells are expected to be representative of potential drawdown over long term water taking. Based on the observed drawdown it is expected that water bearing fractures trend in an south/southwest to north/northeast direction. The present distribution of monitoring wells on site, primarily TW 1-13 and TW 3-13 are expected to function adequately as sentry wells to assess drawdown effects with water taking at TW 2-13 over the long-term.



Water taking from TW 2-13 was considered based on the lowest expected available drawdown based on measured seasonal conditions as part of the ongoing monitoring completed by the City of Hamilton. By maintain a pumping rate suitable to meet demand for the municipal well, but also minimizing the drawdown within the test well, drawdown at a distance from the test well will also be effectively managed. Over the duration of testing drawdown within TW 2-13 was calculated at approximately 15% of available drawdown, with drawdown to the closest monitored private well at 63 Tews Lane amounting to approximately 5% of available drawdown.

Based on the observed drawdown within the pumping well and monitoring wells significant drawdown impacts to private water supply wells in vicinity to TW 2-13 are not expected. The present arrangement of monitoring wells, including TW 1-13 and TW 3-13 is expected to provide adequate coverage for the long-term assessment of drawdown impacts and evaluation of potential well interference claims that may arise from long-term water taking from TW 2-13.

## 7.4.2 Surface Water Impacts

The potential for long-term impacts to surface water was evaluated based on the criteria used as part of the GUDI analysis summarized in Section 7.3 above. Water taking from within limestone bedrock at the location of TW 2-13 is expected to be geologically isolated from the shallow overburden, based on monitoring results from MW 101 over the duration of testing, and surface water features. The following summarizes the conditions considered as part of the GUDI analysis:

- Physical evidence of surface water contamination
- Microscopic particulate including the presence of coliphages within groundwater
- Bacterial contamination of groundwater
- Construction details of the test well including proximity to surface water, depth, temperature and dissolved oxygen variation, and age dating

The above criteria were not met with regards to monitoring for TW 2-13 over the duration of testing. It is expected that TW 2-13 is geologically isolated from surface water features and water taking will not impact surface water features in the vicinity of TW 2-13.

## 7.4.3 Impacts on Water Quality

Water quality impacts were evaluated including parameters within O.Reg. 169/03. There was no available record of environmental site assessments completed within the vicinity of the site. Surrounding


properties consist of residential subdivisions, and estate residential properties. Potentially contaminating activities were not noted within the study area. Further, the City of Hamilton has completed well head mapping and risk assessment for the municipal well FDG01 and similar studies have been completed for TW 2-13 should the well be utilized as a municipal source. Under the Clean Water Act, potentially contaminating activities would be restricted from identified well head protection zones for TW 2-13.

#### 8.0 MONITORING AND CONTINGENCY PLANNING

It is expected that the present network of monitoring wells in place for water taking from FDG01 will be maintained and monitored as part of water taking from TW 2-13. Monitoring wells include TW 1-13, TW 3-13, and MW 101. Monitoring for these wells in addition to TW 2-13 are to be monitored on a continuous basis with measurements at a 10-minute interval, consistent with on-going monitoring and other wells included as part of the monitoring well network operated by the City of Hamilton. Monitoring data from these monitoring wells will provide sufficient baseline data and on-going groundwater elevations with which to evaluate potential well interference claims.

Based on completed sampling, potential issues with total suspended solids and associated total metals poses a concern with regards to water quality as observed within on-site monitoring wells TW 1-13 and TW 3-13. Groundwater sampling indicates that high levels of total metals is not characteristic of groundwater quality for TW 2-13, given that adequate separation is maintained from the base of TW 2-13. For the purposes of this investigation, it was assumed that a 3.0 m separation from the base of the well would be maintained. It is expected that ongoing groundwater quality monitoring will be maintained consistent with the current groundwater monitoring program for FDG01. A review of total suspended solids concentrations should be completed to assess the requirements for well maintenance (i.e., flushing sediment from the base of well), or raising the intake such that suspended solids are not disturbed.

Nitrate concentrations within TW 2-13 were observed to increase over the duration of testing from 1.4 mg/L to 3.2 mg/L and decrease to 1.36 mg/L following completion of testing. There is potential for nitrate mobilization with water taking for TW 2-13 likely as a result of surrounding private subsurface sewage disposal. Nitrate concentrations over the duration of testing did not result in health related exceedances of O.Reg. 169/03. Regular groundwater quality monitoring will be required for nitrate to assess fluctuations with water taking.

In the event that TW 2-13 is utilized as a municipal well a record of daily water taking will be maintained by the City of Hamilton, which will be submitted as part of the PTTW Conditions for water taking. This record will also be useful with which to evaluate well interference claims.

In the event of a well interference claim, a temporary water source would be immediately arranged for the impacted property, and an inspection would be scheduled within 24 hours by City staff and a hydrogeologist. The inspection would include a physical inspection of the impacted well and pumping equipment. The inspection results would be reviewed in conjunction with background information



regarding water taking and groundwater monitoring results to make an assessment as to the cause of the well interference.

If well interference is deemed to be the result of water taking from TW 2-13 the impacted well would be replaced to obtain potable groundwater of suitable quality and quantity for residential use, or a connection would be provided to the impacted property to provide municipal water, at cost to the City.



#### 9.0 SUMMARY AND CONCLUSIONS

- 1. The long-tern yield of TW 2-13 of 90 L/min was assessed to be sustainable over the long term, with a maximum drawdown not expected to exceed 1.0 m. Significant impacts to surrounding private wells are not expected based on the expected drawdown at TW 2-13.
- 2. Given that TW 2-13 is screened within bedrock drawdown will be dependent on the location and orientation of water bearing fractures. Drawdown with distance from TW 2-13 was not observed to have a direct correlation. Based on the observed drawdown it is expected that fractures trend in a southwest to northeast orientation.
- 3. Under the above completed GUDI analysis and considering the results of completed age dating, indicating surface water is derived from precipitation and was observed to have a different O<sup>18</sup> and H<sup>2</sup> ratio when compared to groundwater, TW 2-13 should not be considered as a GUDI source. Groundwater is expected to be geologically isolated from surface water features.
- 4. It is expected that the present network of monitoring wells in place for water taking from FDG01 will be maintained and monitored as part of water taking from TW 2-13. Monitoring wells include TW 1-13, TW 3-13, and MW 101. Monitoring for these wells in addition to TW 2-13 are to be monitored on a continuous basis.
- 5. Based on completed sampling potential issues with total suspended solids and associated total metals poses a concern with regards to water quality. Groundwater sampling indicates that high levels of total metals is not characteristic of groundwater quality given that adequate separation is maintained from the base of TW 2-13. For the purposes of this investigation, it was assumed that a 3.0 m separation from the base of the well would be maintained.
- 6. It is expected that ongoing groundwater quality monitoring will be maintained consistent with the current groundwater monitoring program for FDG01. A review of total suspended solids concentrations should be completed to assess the requirements for well maintenance (i.e., flushing sediment from the base of well), or raising the intake such that suspended solids are not disturbed.



We trust this report meets with your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

### Yours truly, **Terraprobe Inc.**

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Paul L. Raepple, P.Geo. Project Manager

Stoney Creek Office



R. Baker Wohayeb, M.A.Sc., P. Eng., QP<sub>RA</sub> Principal











#### TABLE 1: SUMMARY OF DOOR-TO-DOOR PRIVATE WELL SURVEY CITY OF HAMILTON PUMPING TEST JOHNSON TEW PARK, DUNDAS, ONTARIO

ADDRESS	NAME	WELL TYPE	WATER LEVEL (mbgl)	WELL DEPTH (mbgl)	TREATMENT SYSTEMS	WELL USE	WELL DEMAND	COMMENTS
1 Tews Lane	Unknown	Driking Water	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
4 Tews Lane	Unknown	Driking Water	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
6 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
12 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
16 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
17 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
20 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
24 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
28 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
32 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
35 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
36 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
39 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
40 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
43 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
44 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
47 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
51 Tews Lane	Unknown	Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
55 Tews Lane	Unknown	Driking Water	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
		Well						
59 Tews Lane	Unknown	Well Driking Water Well	None	None	Septic System	Residential	Unknown	No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane	Unknown Unknown	Well Driking Water Well Driking Water Well	None 14.94	None 28	Septic System Softner, UV, RO	Residential Residential, landscaping	Unknown 4 persons	No Response. Letter left at residence. Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive	Unknown Unknown Unknown	Well Driking Water Well Driking Water Well Driking Water Well	None 14.94 None	None 28 None	Septic System Softner, UV, RO Septic System	Residential Residential, landscaping Residential	Unknown 4 persons Unknown	No Response. Letter left at residence. Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive	Unknown Unknown Unknown Unknown	Well Driking Water Well Driking Water Well Driking Water Well	None 14.94 None None	None 28 None None	Septic System Softner, UV, RO Septic System Septic System	Residential Residential, landscaping Residential Residential	Unknown 4 persons Unknown Unknown	No Response. Letter left at residence. Spoke with property owner, Agreed to participate in well survey. Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence. No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive	Unknown Unknown Unknown Unknown Unknown	Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well	None 14.94 None None 6.67	None 28 None None 18.96	Septic System Softner, UV, RO Septic System Septic System Softner RO	Residential Residential, landscaping Residential Residential Residential	Unknown 4 persons Unknown Unknown 5 persons	No Response. Letter left at residence.           Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane.           No Response. Letter left at residence.           No Response. Letter left at residence.           No Response. Letter left at residence.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well location-backyard under wooden washing well structure.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown	Well           Driking           Water           Well	None 14.94 None None 6.67 None	None           28           None           18.96           13.7	Septic System Softner, UV, RO Septic System Septic System Softner RO Softner UV	Residential Residential landscaping Residential Residential Residential, landscaping, pool, hot tub Residential	Unknown 4 persons Unknown 5 persons 5 persons	No Response. Letter left at residence. Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence. No Response. Letter left at residence. Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure. Agreed to participate in well survey. However, access to the well casing-to issues, well location-backyard under wooden washing well structure.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Water Well Driking Water Wat	None 14.94 None 6.67 None None	None           28           None           18.96           13.7           None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System	Residential Residential, landscaping Residential Residential Residential, landscaping, pool, hot tub Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown	No Response. Letter left at residence. Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-subplur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence. Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-subplur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence. Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure. Agreed to participate in well survey. However, access to the well cap was not possible. Continuous monitoring of water levels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quality or quantity occurred throughout and follwing the puming test. No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive 6 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well	None 14.94 None None 6.67 None None None	None 28 None 18.96 13.7 None None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System Septic System	Residential Residential, landscaping Residential Residential Residential, landscaping, pool, hot tub Residential Residential Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown Unknown	No Response. Letter left at residence. Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence. Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane. No Response. Letter left at residence. Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no sues, well location-backyard under wooden washing well structure. Agreed to participate in well survey. However, access to the well cap was not possible. Continuous monitoring of water levels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quality or quantity occurred throughout and follwing the puming test. No Response. Letter left at residence. No Response. Letter left at residence. No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive 6 Medwin Drive 7 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well Driking Water Water Well Driking Water Water Well Driking Water Water Well Driking Water Well Driking Water Water Well Driking Water Well Driking Water Water Well Driking Water Water Well Driking Water Water Well Driking Water Water Water Well Driking Water Water Water Water Water Water Water Water Well Driking Water Water Well Driking Water Water Well Driking Water Water Well Driking Water Water Well Driking Water Water Well Water Well Water Well Water Well Water Well Water Well Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Driking Water Well Weter Well	None 14.94 None None 6.67 None None None None	None 28 None None 18.96 13.7 None None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System Septic System	Residential Residential landscaping Residential Residential Residential Residential Residential Residential Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown Unknown Unknown	No Response. Letter left at residence.           Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane.           No Response. Letter left at residence.           No Response. Letter left at residence.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey. However, access to the well cap was not possible. Continuous monitoring of water feels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quality or quantity occurred throughout and follwing the purning test.           No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive 6 Medwin Drive 7 Medwin Drive 8 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well           Driking           Water           Well           Water           Well	None 14.94 None 6.67 None None None None None None None	None 28 None 18.96 13.7 None None None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System Septic System Septic System Septic System	Residential Residential, landscaping Residential Residential Residential Residential Residential Residential Residential Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown Unknown Unknown	No Response. Letter left at residence.           Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane.           No Response. Letter left at residence.           No Response. Letter left at residence.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey. However, access to the well cap was not possible. Continuous monitoring of water levels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quantity or quantity occurred throughout and follwing the puming test.           No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive 6 Medwin Drive 7 Medwin Drive 8 Medwin Drive 9 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well           Driking           Vater           Well           Driking           Water           Well	None 14.94 None 6.67 None None None None None None None None	None 28 None 18.96 13.7 None None None None None None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System Septic System Septic System Septic System	Residential Residential, landscaping Residential Residential Residential Residential Residential Residential Residential Residential Residential Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown Unknown Unknown Unknown	No Response. Letter left at residence.         Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane.         No Response. Letter left at residence.         Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.         Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.         Agreed to participate in well survey, However, access to the well cag was not possible. Continuous monitoring of water levels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quality or quantity occurred throughout and follwing the puming test.         No Response. Letter left at residence.       No Response. Letter left at residence.         No Response. Letter left at residence.       No Response. Letter left at residence.         No Response. Letter left at residence.       No Response. Letter left at residence.         No Response. Letter left at residence.       No Response. Letter left at residence
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive 6 Medwin Drive 7 Medwin Drive 8 Medwin Drive 9 Medwin Drive 10 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well           Driking           Vater           Well           Driking           Water	None 14.94 None 6.67 None None None None None None None None	None 28 None 18.96 13.7 None None None None None None None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System Septic System Septic System Septic System Septic System Septic System	Residential Residential, landscaping Residential Residential Residential Residential Residential Residential Residential Residential Residential Residential Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown Unknown Unknown Unknown Unknown	No Response. Letter left at residence.           Spoke with property owner, Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well kype- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-sulphur odour-tank installed, water quantity-no issues, well location-side yard towards back left side from Tews Lane.           No Response. Letter left at residence.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type-drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quantity-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey, However, access to the well cap was not possible. Continuous monitoring of water levels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quality or quantity occurred fivel hroughout and follwing the puming test.           No Response. Letter left at residence.         No Response. Letter left at residence.
59 Tews Lane 63 Tews Lane Medwin Drive 1 Medwin Drive 2 Medwin Drive 3 Medwin Drive 4 Medwin Drive 5 Medwin Drive 6 Medwin Drive 7 Medwin Drive 8 Medwin Drive 9 Medwin Drive 10 Medwin Drive	Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown	Well           Driking           Vater           Well           Driking           Water	None 14.94 None 6.67 None None None None None None None None	None 28 None 18.96 13.7 None None None None None None None None	Septic System Softner, UV, RO Septic System Softner RO Softner UV Septic System Septic System Septic System Septic System Septic System Septic System	Residential Residential, landscaping Residential	Unknown 4 persons Unknown 5 persons 5 persons Unknown Unknown Unknown Unknown Unknown	No Response. Letter left at residence.           Spoke with property owner, Agreed to participate in well survey, Installed data logger on Decomber 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-unknown, date constructed-2016, water quality-no issues, well location-side yard towards back left side from Tews Lane.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria times, water game, bacteria times, well yee- drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria times, water quality-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey, Installed data logger on December 01, 2022, and took water samples, well type- drilled, casing-steel, pump type-submersible, date constructed-1997, water quality-low level bacteria at times, water quality-no issues, well location-backyard under wooden washing well structure.           Agreed to participate in well survey, However, access to the well cap was not possible. Continuous monitoring of water levels were not obtained. Resident was advised to contact fieldstaff if any noteable changes to water quality or quantity occurred throughout and follwing the puming test.           No Response. Letter left at residence.
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	Surface	ace Well	Well							
	Elevation	ation Depth	Depth							
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TW2-13	243.76	243.76 21	67 222.09							
							12-D	ec-22		
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#### Table 3: Summary of On-site and Off-site Manual Water Levels City of Hamilton Municipal Pumping Test Johnson Tew Park, Dundas, Ontario

Location	Approximate Ground Surface Elevation (masl)	Well	Depth												Re	esident	Grour	nd Wat	ter Lev	els											
		mbgl	masl																												
				1	L2-Dec-22		13-D	ec-22				14-	Dec-22					15-D	ec-22												
TW/1	248 92	23 15	225 77		17:50	9:	:00	10	:50	10	):00	1	1:50	15	5:30	10	:00	14	l:15	16:4	10										
1001	240.52	23.15	223.77	mbg	gl masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl										
				15.3	2 233.6	15.53	233.39	15.55	233.37	16.03	232.89	15.83	233.09	15.51	233.41	15.52	23.4	15.5	233.42	15.6	233.32					-					
				1	12-Dec-22				13-D	ec-22						14-D	ec-22					15-D	ec-22								
TW3	246.1	26.34	219.76		17:50	9:	:10	10:0	0 AM	12	2:00	1	6:00	10	0:00	11	:40	15	5:20	10:3	80	14	:00	16	5:30						
				mbg	gl masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl						
				12.6	3 232.47	12.77	232.33	12.77	232.33	12.78	232.32	12.78	232.32	12.8	232.3	12.78	232.32	12.81	232.39	12.8	232.3	12.77	232.33	12.77	232.33						
				1	l2-Dec-22			13-D	ec-22					14-0	Dec-22					15-De	c-22										
MW101	243.76	23.15	220.61		17:30	8:	:30	10:3	0 AM	14	:30	1	0:00	12	2:00	15	:30	9	:30	14:0	00	17	:00								
				mbg	gl masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl								
				8.68	3 235.24	8.69	235.23	8.68	235.24	8.69	235.23	8.68	235.24	8.65	235.27	8.69	235.23	8.69	235.23	8.68	235.24	8.69	235.23								
				0	1-Dec-22		12-D	ec-22				13-	Dec-22						14-C	ec-22						15-D	ec-22			21-De	ac-22
3 Medwin Drive	236	18.97	217.03		13:00	12	2:10	6:20	) PM	8	:20	1	1:40	17	7:10	8:	10	11	.:10	11:4	10	16	:30	8:	:30	12	:30	15	:30	11:	.20
				mbg	gl masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl	mbgl	masl
				6.3	229.7	6.68	229.32	6.32	229.68	6.51	229.49	6.31	229.69	6.33	229.67	6.33	229.67	6.29	229.71	6.38	229.62	6.4	229.6	6.34	229.66	6.32	229.68	6.39	229.61	6.35	229.65
				0	19-Dec-22		12-D	ec-22			13-L	ec-22	C-40		. 10	1.0	14-D	ec-22		10.2			20	15-D	ec-22	10		21-D	ec-22		
15 Medwin Drive	241	18.3	222.7		17:40	11		16	:00	1.	.:30	1	6:40	8	:40	10	:50	13	5:30	16:2	. 0	8	30	12	.30	16	:00	21	:20		
				mbg	gi masi	mbgl	masi	mbgl	masi	mbgl	masi	mbgi	masi	mbgi	masi	mbgi	masi	mbgi	masi	mbgi	masi	mbgl	masi	mbgl	masi	mbgl	masi	mbgl	masi		
				13.0	1 227.99	13.04	227.96	13.41	227.59	13.24	227.76	13.24	227.76	13.39	227.61	13.76	227.24	13.48	227.52	13.83	227.17	13.33	227.67	13.6	227.4	13.05	227.95	13.23	227.77	21.0	
600 Harrist David (42				0	14:00	11	12-D	ec-22	0.044		-20	13-	1.20	10		0	20	10	14-L	12.2	0	10	.20	0.	.20	15-0	-20	10		21-De	30-22
609 Harvest Road (13	239	17.07	221.93	an h a	14:00	11	L:40	0:10	J PIVI maai	0 mhai	.20		1:50	IC mehal	5:50	0. mahal	20	IL.	):20	13:3	50 maal	10	:20	8: mhal	:20	12	.30	15	:40	11:	.40
wiedwin Drive)				mbg		mbgi	220.52	mbgi 40.40	220.04	mbgi	220.20	mbgi	220.42		220.52	mbgi	220.62	mbgi	220.54	mbgi	220.54	10.54	220.40	nigum	220.62	mbgi	masi	mbgi 40.02	220.07	mbgi 40.52	220.40
				10.3	1-Dec-22	10.48	228.52 12-D	10.19	228.81	10.61	228.39	10.57	228.43 Dec-22	10.47	228.53	10.38	228.02	10.46	228.54 14-D	10.40	228.54	10.51	228.49	10.37	228.03 15-D	10.4	228.0	10.93	228.07	10.52	228.48
					11.10	12	12-0	19	.20		10	15-	1.40	17	7.10	0.	10	11	14-L	12.5	0	16	.40	12	13-0	15	.10	21-0	10		
63 Tews Lane	247	28	219	mba	I mad	mbal	macl	mbal	.20	mbal	masl	mbal	1.40 macl	mbal	macl	o. mbal	macl	mbal	macl	mbal	macl	mbal	.40 macl	mbal	macl	mbal	macl	mbal	.10 macl		
				14.2	2 232,8	14.23	232.77	14.48	232.52	14.65	232.35	14.88	232.12	14.64	232.36	14.71	232.29	14.68	232.32	14.66	232.34	14.7	232.3	14.67	232.33	14.67	232.33	14.26	232.74		

### Table 4: Summary of On-Site Water Quality Sampling Pumping Well TW 2-13 Greensville Municipal Well FDG01 Replacement

Client: Hamilton Water Attention: Marco Silvario		Work Completed By: Project No.:	Terraprobe Inc Stoney Creek T1220561.000					
City of Hamilton - Environmental Laboratory		Project Name:	Municipal Well Ass	essment				
Adddress: 700 Woodward Avenue, Hamilton, Ontario, L8H 6F	'n	Sampier initials:	ABC and HP					
Sample ID: TW-2-13	ODWR	10/00	Unite		Analysis			
Date and Time	ODW3	A0/0G	onita	12-Dec-22	13-Dec-22	14-Dec-22		
INORGANICS		20 500	mall	202	218.0	320		
Ammonia + Ammonium		50-500	mg/L	<0.01	<0.01	<0.01		
Anion Sum (Calculation)			mg/L	7.6	10.7	11.4		
Bromide			mg/L	<1	<1	<1		
Cation Sum (Calculation)		250	mg/L mg/l	7.3	10.5	10.8		
Colour (apparent)		5	CU	39	4.0	3		
Conductivity Cvanide - Total	0.2		umho/cm ma/L	654 <0.003	970.0	1020		
Dissolved Organic Carbon		5	mg/L	1.8	0.9	1.1		
Fluoride	1.5		mg/L	0.12	0.2	0.16		
Nitrate as N	10		mg/L	1.41	2.9	3.2		
Nitrate + Nitrite as N	1		mg/L	1.41	2.9	3.2		
o-Phosphase as P	-		mg/L	<0.05	<0.05	<0.05		
pH		6.5 - 8.5	pН	7.87	7.86	7.87		
pH-Saturation Silica-Reactive			pH mg/L	6.96	6.86	6.85		
Sulphate			mg/L	44.1	66.5	66.5		
Temperature Total Suspended Solids		500	C mg/l	20.9	20.4	20.9		
Turbidity		5	NTU	6.83	0.47	0.47		
Hardness		80 - 100	mg/L	334	431	436		
METALS Total Aluminum (AI)		0.1	ma/L	0.106	0.003	<0.002		
Total Antimony (Sb)	0.06		mg/L	<0.0001	<0.0001	<0.0001		
Total Arsenic (As)	0.01		mg/L	0.0033	0.0003	0.0002		
Total Barlum (Ba)	L		mg/L	<0.0001	< 0.0001	<0.0001		
Total Bismuth	-		mg/L	< 0.0001	< 0.0001	< 0.001		
Total Boron (B) Total Cadmium (Cd)	0.005		mg/L mg/L	< 0.0001	< 0.0001	<0.0001		
Total Calcium (Ca)			mg/L	103	134	134		
Total Cobalt (Co)	0.05		mg/L mg/L	0.0022	<0.0002	0.0002		
Total Copper (Cu)		1	mg/L	0.0015	0.0005	0.0005		
Total Iron (Fe)	0.01	0.3	mg/L	1.96	0.065	0.042		
Total Lithium (Li)	0.01		mg/L	0.0068	0.0099	0.0114		
Total Magnesium (Mg)		0.05	mg/L	18.6	24.1	24.6		
Mercury (Hg)	1	0.05	mg/L ug/L	<0.0339	<0.05	0.0056 <0.05		
Total Molybdenum (Mo)			mg/L	0.0004	0.0004	0.0004		
Total Nickel (Ni) Total Potassium (K)			mg/L mg/L	0.0009	0.0005	0.0005		
Total Selenium (Se)	0.05		mg/L	0.0002	0.0002	0.0002		
Total Silicon (Si) Total Silver (Ag)			mg/L mg/L	6.87 <0.0001	<0.0001	8.06 <0.0001		
Sodium (Na)		20/200	mg/L	12.1	41.5	46.9		
Total Strontium (Sr) Total Thallium (TI)			mg/L mg/L	< 0.0003	<0.0003	<0.0003		
Total Tin (Sn) Total Titopium (Ti)			mg/L	< 0.0001	< 0.0001	<0.0001		
Total Tungsten (W)			mg/L	0.0003	< 0.0004	<0.0004		
Total Uranium (U)	20		ug/L	0.615	0.717	0.747		
Total Zinc (Zn)		5	mg/L	0.065	0.036	0.035		
Total Zirconium (Zr)			mg/L	0.0004	<0.004	<0.0004		
Dissolved Phosphorus (P)			mg/L	0.019	<0.010	<0.010		
MICROBIOLOGICAL / ORGANICS	-			•	•	•		
Escherichia Coli Coliform	0		MPN/100mL MPN/100mL	0	0	0		
1,1-Dichloroethylene	14		ug/L	<0.2	<0.2	<0.2		
1,2-Dichlorobenzene	200		ug/L	<0.2	<0.2	<0.2		
1,2-Dichloroethane 1,4-Dichlorobenzene	5		ug/L ug/L	<0.2	<0.2	<0.2		
Benzene	1		ug/L	<0.2	<0.2	<0.2		
Bromodichloromethane			ug/L	<0.2	<0.2	<0.2		
Carbon Tetrachloride	2		ug/L	<0.2	<0.2	<0.2		
Chlorobenzene	80		ug/L	<0.3	<0.3	<0.3		
Chlorotorm Dibromochloromethane			ug/L ug/l	<0.2	<0.2	<0.2		
Dichloromethane	50		ug/L	<0.5	<0.5	<0.5		
Ethylbenzene	140		ug/L	<0.2	<0.2	<0.2		
пт+р-лутепе o-Xylene			ug/L ua/L	<0.4	<0.4	<0.4		
Tetrachloroethylene	10		ug/L	<0.2	<0.2	<0.2		
Toluene Total Tribalomethanes	60		ug/L	<0.2	<0.2	<0.2		
Trichloroethylene	5		ug/L ug/L	<0.4	<0.4	<0.2		
Vinyl Chloride	1		ug/L	<0.2	<0.2	<0.2		
Xylene Caffeine	90	<u> </u>	ug/L	<0.5	<0.5	<0.5		

#### Table 4: Summary of On-Site Water Quality Sampling Pumping Well TW 2-13 Greensville Municipal Well FDG01 Replacement

Attention: Marco Silvario		Work Completed By: Project No.:	Terraprobe Inc S T1220561.000	toney Creek	
City of Hamilton Environmental Laboratory		Project Name: Sampler Initials:	Municipal Well Ass ABC and HP	essment	
700 Woodward Avenue, Hamilton, Ontario, L8H 6PN Sample ID: TW 2-13	00000	40100	Unite	403	hele
Date and Time	UDWS	AUIUG	Units	15-Dec-22	17-Jan-23
Akalnity (Total as CaCO3)		30-500	mg/L	311	304
Anion Sum (Calculation) Bicarbonate as Carbonate (Calculation)			mg/L mg/L		7.6
Bromide Cation Sum (Calculation)			mg/L mg/L		<1 7.5
Chloride Colour (apparent)		250 5	mg/L CU	107 3	10.8 <2
Conductivity Cyanide - Total	0.2		umho/cm mg/L	1020 <0.003	634 <0.003
Dissolved Organic Carbon Fluoride	1.5	5	mg/L mg/L	0.6	<0.4
lon Balance (Calculation) Nitrate as N	10		% mg/L	3.21	0.7
Nitrate + Nitrite as N Nitrite as N	1		mg/L mg/L	<0.05	1.36
o-Phosphase as P		65.85	mg/L nH		<0.05
pH-Saturation			pH		6.93
Silancercerce			mg/L	66.3	36.3
Total Suspended Solids		500	mg/L		<2
Turbidity Hardness		5 80 - 100	NTU mg/L	0.36 433	0.26
TOTAL METALS Total Aluminum (Al)		0.1	mg/L	<0.002	<0.002
Total Antimony (Sb) Total Arsenic (As)	0.006		mg/L mg/L	<0.0001 0.0002	<0.0001 0.0002
Total Barium (Ba) Total Berytlum (Be)	1		mg/L mg/L	0.11	0.0917 <0.0001
Total Bismuth Total Boron (B)	5		mg/L mg/L	<0.0001	<0.0001 0.015
Total Cadmium (Cd) Total Calcium (Ca)	0.005		mg/L mg/L	<0.0001 133	<0.0001 111
Total Chromium (Cr) Total Cobalt (Co)	0.05		mg/L mg/L	0.0002	0.0005 <0.0001
Total Copper (Cu) Total Iron (Fe)		1 0.3	mg/L mg/L	0.0006	0.0004
Total Lead (Pb) Total Lithium (Li)	0.01		mg/L mg/L	<0.0001 0.0108	<0.0001 0.007
Total Magnesium (Mg) Total Manganese (Mn)		0.05	mg/L mg/L	24.6 0.0053	172
mercu y (Hg) Total Molybdenum (Mo)	1		mg/L mg/L	<0.05	<0.05
Total Nickel (Ni) Total Potassium (K)			mg/L mg/L	0.0005	0.0003
Total Silver (St)	0.05		mg/L	7.89	6.76
Sodum (Na) Total Streetium (Sr)		20/200	mg/L mg/L	~0.0001 48	~0.0001 10.9
Total Thalium (TI) Total Tin (Sn)			mg/L mol	<0.0003	<0.0003 <0.0003
Total Titanium (Ti) Total Tunasten (W)			mg/L mol	0.0004	0.0007
Total Uranium (U) Total Vanadium (V)	20		mg/L mg/L	0.754	0.547
Total Zinc (Zn) Total Zirconium (Zr)		5	mg/L mg/L	0.032	0.036
DISSOLVED METALS Dissolved Aluminum (Al)		0.1	mol		<0,002
Dissolved Antimony (Sb)	0.06	0.1	mg/L		<0.0001
Dissolved Arsenic (As) Dissolved Barium (Ba)	0.01		mg/L mg/L		0.0002
Dissolved Beryllum (Be) Dissolved Bismuth			mg/L mg/L		<0.0001
Dissolved Boron (B) Dissolved Cadmium (Cd)	5		mg/L		0.015
Dissolved Calorim (Ca) Dissolved Calorim (Ca)	0.005		mg/L		110
Dissolved Chromum (Cr) Dissolved Cobalt (Co)	0.05		mg/L		<0.0001
Dissolved Copper (Cu) Dissolved Iron (Fe)		0.3	mg/L mg/L		0.0004
Dissolved Lead (Pb) Dissolved Lithium (Li)	0.01		mg/L mg/L		<0.0001 0.007
Dissolved Magnesium (Mg) Dissolved Manganese (Mn)		0.05	mg/L mg/L		17.6
Mercury (Hg) Dissolved Molybdenum (Mo)	1		ug/L mg/L		<0.05
Dissolved Nickel (Ni) Dissolved Potassium (K)			mg/L mg/L		0.0003
Dissolved Selenium (Še) Dissolved Silicon (Si)	0.05		mg/L mg/L		0.0003
Dissolved Silver (Ag)		20/200	mg/L		<0.0001
Dissolved Strontum (Sr) Dissolved Thalium (Ti		20/200	mg/L mg/L		0.613
Dissolved Tin (Sn) Dissolved Titanium (Ti)			mg/L mg/L		<0.0001 0.0007
Dissolved Tungsten (W) Dissolved Uranium (U)	20		mg/L ug/L		<0.0001 0.547
Dissolved Vanadium (V) Dissolved Zinc (Zn)		5	mg/L mg/L		<0.0001 0.036
Dissolved Zirconium (Zr)			mg/L		<0.0004
Total Phosphorous (P) Dissolved Phosphorus (P)			mg/L mol	0.018	<0.010
MICROBIOLOGICAL / ORGANICS					SHELLIN
					~0.010
Escnerichia Coli Coliform	0		MPN/100mL MPN/100mL	0	0
escnerichia Coli Colform 1,1-Dichloroethylene 1,2-Dichlorobenzene	0 0 14 200		MPN/100mL MPN/100mL ug/L ug/L	0 <0.2 <0.2	0 0 <0.2 <0.2
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acomento Col Colomination of the second of t	0         0           14         200           201         1           1         1           2         80           80         80           10         10           10         10           10         10           10         10           10         5           11         5           900         5           20         9           10         10           10         5           11         5           900         5           20         9           10         1           10         5           11         5           12         9           13         1           14         1           15         50           11         50           12         10           13         1           14         1           15         50           16         50           17         10           10         10           10         10 <td></td> <td>HIPPUT0001 INFUT00001 INFUT00001 INFUT00001 INFUT00001 INFUT00001 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT000000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT0000000 INFUT0000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT00000000 INFUT00000000 INFUT000000000000000000000000000000000000</td> <td><math display="block">\begin{array}{c} 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ </math></td> <td>B           0         0</td>		HIPPUT0001 INFUT00001 INFUT00001 INFUT00001 INFUT00001 INFUT00001 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT000000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT00000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT0000000 INFUT0000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT000000 INFUT00000000 INFUT00000000 INFUT000000000000000000000000000000000000	$\begin{array}{c} 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ $	B           0         0
anomethol Col Caliform Caliform 1.3 Delitorbarease 1.4 Delitorbarease	0         0           0         14           120         15           1         1           2         80           1         1           90         140           140         140           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           200         120           100         120           100         120           100         100		HPHY1000-1 UPHY1000-1 UPL UPL UPL UPL UPL UPL UPL UPL	$\begin{array}{c} 0 \\ 0 \\ 0 \\ -0 \\ -0 \\ 2 \\ -0 \\ 2 \\ -0 \\ 2 \\ -0 \\ -0$	B           0
aconsento Col Conform	0         0           14         200           201         1           1         1           1         1           1         10           66         100           100         100		BHYU1000-1     BHYU1000-1     UgL	0           0           -02           -03           -04           -02           -03           -04           -02           -03           -04           -02           -03           -04           -03           -03           -03           -03           -03           -03           -03           -03           -03           -03           -03           -03           -03           -03           -03	Other         0           0         0
acomento Col accoment Colomics Colomics 1.5 Debiotophere 1.5 Debiotophere 1.5 Debiotophere 1.5 Debiotophere 1.5 Debiotophere Bonndelsonersten Aussichersten Bonndelsonersten Bonndels	0           0           14           200           1           200           1           2           80           5           5           5           60           100           500           5           900           5           900           5           200           0.01           10           90           90           11           20           20           10           10           11           120           220           220           220           220           220           220           120           220           220           220           220           220           220           220           220           220           220           220			$\begin{array}{c} 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ $	B           0         0
anometho Col Carlom Carlom Carlom La Delto toderasea La Delto toderasea La Delto toderasea La Delto toderasea La Delto toderasea Carlom Biornolon Carlom Carlom Carlom Carlo Delto toderasea Carlom Carlo Delto toderasea Carlo Delto toderasea Carlo Carl	0         0           14         0           120         0           3         5           1         1           2         80           1         1           10         160           100         100           100         100           100         100           100         100           100         100           100         100           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           11         10           120         10           20         20           20         20           200         20           200         20           200         20		HIPPUT000-1 UPPUT000-1 UPL UPPUT000-1 UPL UPL UPL UPL UPL UPL UPL UPL	0         0           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 2         02           0 3         02           0 4         02           0 5         01           0 61         02           0 63         01           0 601         001           0 601         001           0 601         001           0 601         001           0 602         001           0 603         001           0 604         0000           0 603         001           0 603         001           0 603         001           0 603         001           0 603         001           0 603         001           0 60	B           0
anomento Col Carlino	0         0           14         0           20         1           1         1           2         0           3         1           1         1           140         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           100         10           110         10           110         10           110         10           110         10           110         10           110         10           110         10           110         10           11		BHYU1000-1     BHYU1000-1     UgL	0         0           0         0           02         02           02         02           02         02           02         02           02         02           02         02           02         02           02         02           02         02           02         02           03         04           04         02           05         03           04         02           05         03           05         03           05         03           05         03           05         03           05         03           05         03           050         03           050         03           050         03           050         04           050         04           050         04           050         04           050         04           050         04           050         04           050         04           050	Other         Control           0         0           0 <td< td=""></td<>
anomento Col Conform C	0           0           14           200           15           1           2           80           1           20           10           100           100           5           50           100           5           50           5           50           5           50           5           50           5           50           5           50           10           10           10           10           10           10           10           10           10           10           110           110           110           110           110		BHYU10001     BHYU10001     UgL	$\begin{array}{c} 0\\ 0\\ 0\\ -02\\ -02\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\$	B           0
senements Col actions Calcins Calcins La Debit orderanse La Debit orderanse La Debit orderanse La Debit orderanse Calcins Biornelfon Calcins Biornelfon Calcins C	0         0           0         1           1         3           3         5           1         1           2         80           1         10           10         10           10         10           10         10           10         5           5         5           70         5           5         5           70         5           20         5           20         5           20         70           9         9           9         11           10         10           11         10           12         10           13         10           14         10           15         11           10         11           11         10           120         11           130         12           130         13           140         10           150         10           150         10           150         10 </td <td></td> <td>BHP100001     BHP100001     BP100001     BP100001     BP100001     BP10000     BP10000     BP10000     BP1000     BP1000     BP1000     BP1000     BP100     BP100     BP10     BP10     BP10     BP10     BP10     BP1     BP1</td> <td>0         0           -0.2         -0.2           -0.2</td> <td>B           0</td>		BHP100001     BHP100001     BP100001     BP100001     BP100001     BP10000     BP10000     BP10000     BP1000     BP1000     BP1000     BP1000     BP100     BP100     BP10     BP10     BP10     BP10     BP10     BP1	0         0           -0.2         -0.2           -0.2	B           0
anometho Col Carlino and Col Carlino Tera Carlino and Col Carlino Tera Carlino and Col Carlino and Carlino and Col Carlino and Carlino and Col Carlino and Carlino and	0         0           14         0           20         1           5         1           7         3           90         140           140         140           160         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           100         100           110         100           110         100           110         100           110         100           110         100           110         100           110         100           110         100           110         100           110         100			0           0           02           03           04           02           04           02           04           02           04           02           04           02           04           02           04           02           04           02           04           02           04           02           04           02           04           03           040           040           040	Other         Other           0         0
anometho Col Conform C	0         0           14         200           200         14           201         1           1         1           2         80           1         1           1         1           100         60           101         100           5         900           5         900           5         900           5         900           5         900           5         900           101         1           102         1           103         1           104         100           105         100           106         100           107         100           108         100           109         100           100         100           101         100           102         100           103         100           104         100           105         100           106         100           107         100           1080         100		BHYU1000-1     Upi	0         0           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -03         -02           -04         -02           -05         -02           -01         -02           -02         -02           -03         -03           -04         -04           -05         -04           -06         -05           -07         -06           -08         -06           -09         -06           -01         -06           -02         -07           -03         -08           -04         -06           -05         -06           -06         -07           -07         -08           -08	B           0
sciencento Col Carlon Carlon Carlon La Delto toerarese La Delto toerarese Delto toerarese Biornalon Carlo	0         0           0         14           120         20           1         5           1         1           2         80           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           110         10           110         10           110         10           111         10           111         11           111         11           111         11           111         11           111         11           111         11           111         11           111         11           111         11           112         11           113         11           113         11           113         11           114         11           115 <td></td> <td>BATHORME     BATHORME     BATHORME</td> <td><math display="block">\begin{array}{c} 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ </math></td> <td>B           0</td>		BATHORME	$\begin{array}{c} 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ 0\\ $	B           0
sementa Col Carlon Carl	0         0           14         0           22         1           5         1           7         5           80         1           10         1           10         1           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           10         10           11         10           12         10           13         10           14         10           15         10           16         10           17         10           10         10           10         10           120         120           121         120           122         120           13         10           10         10		Bit NetWood           ugL           ugL     <	$\begin{array}{c} 0 \\ 0 \\ 0 \\ -0.2$	B           0
sementa Col Carlon Carlon Carlon Carlon Color Co	0         0           14         14           200         15           1         1           2         1           3         1           3         1           10         6           60         100           100         5           50         1           100         5           50         100           5         50           100         5           50         10           10         10           100         5           90         10           10         10           10         10           10         10           10         10           10         10           10         10           11         10           100         10           101         10           102         10           103         10           104         10           105         10           106         10           107         10           108 <t< td=""><td></td><td>BATHODONE     BATHODONE     BATHODONE</td><td>0         0           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -03         -02           -04         -02           -05         -04           -02         -02           -03         -03           -04         -04           -05         -04           -06         -03           -06         -03           -06         -03           -06         -03           -06         -04           -07         -08           -08         -08           -08         -08           -08         -08           -08         -08           -08         -08           -08</td><td>Bornor           0</td></t<>		BATHODONE	0         0           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -02         -02           -03         -02           -04         -02           -05         -04           -02         -02           -03         -03           -04         -04           -05         -04           -06         -03           -06         -03           -06         -03           -06         -03           -06         -04           -07         -08           -08         -08           -08         -08           -08         -08           -08         -08           -08         -08           -08	Bornor           0
anometho Col Carton Carton La Dorbit ordenane La Dorbit ordenane La Dorbit ordenane La Dorbit ordenane La Dorbit ordenane Second Biornalor Biornalor Biornalor Biornalor Carton C	6         7           0         1           1         3           3         5           1         1           2         80           100         160           100         160           100         100		BHPH00ert	0         0           -0.2         -0.2           -0.2	B           0         0
anometho Col Carlon Car	0           0           14           220           15           1           2           80           1           90           140           140           140           140           140           140           140           140           100           101           100           101           102           103           104           105           105           106           107           108           109           100           110           111           111           111           111           111           111           111           111           111           111           111           111           111           111           111           111           111           111           <		BHTWOOML           UPL	0         0           0         -02           02         -02           02         -02           02         -02           02         -02           02         -02           02         -02           02         -02           03         -02           04         -02           05         -03           04         -02           05         -04           04         -02           05         -04           05         -04           06         -03           06         -03           07         -04           08         -04           09         -03           09         -03           09         -03           09         -03           09         -03           09         -03           000         -04           000         -04           000         -04           000         -04           000         -04           000         -04           000         -04	0           0

ODWS - Ontario Drinking Water Standards AOIOG - Aesthetic Objective/Operational Guidelines (1) Values reported may be biased low due to overgrowth.

Project T1220561.000

### Table 4: Summary of On-Site Water Quality Sampling Monitoring Well TW 1-13 Greensville Municipal Well FDG01 Replacement

tention: Marco Silvario Ity of Hamilton - Environmental Laboratory iddress: 700 Woodward Avenue, Hamilton, Ontario,	Project No.: Project Name: Sampler Initials:	T120561.000 Municipal Well Assessment ABC and HP					
ample ID: TW-1-13 ate and Time	ODWS	A0/0G	Units	12-Dec-22	Analysis 15-Dec-22	17-Jan-23	
ORGANICS kalinity (Total as CaCO3)		30-500	mg/L	286	275	283.0	
nmonia + Ammonium nion Sum (Calculation)			mg/L mg/L	0.05 8.2	0.02 8.5	0.0 8.7	
carbonate as Carbonate (Calculation) romide			mg/L mg/L	286 <1	275 <1	283.0 <1	
ation Sum (Calculation) hloride		250	mg/L mg/L	40.3 8.9	161 10.6	8.4 26.4	
olour (apparent) onductivity		5	CU umho/cm	30200 652	162000 650	99.0 708.0	
yanide - Total issolved Organic Carbon	0.2	5	mg/L mg/L	<0.003 1.6	<0.003 7.4	<0.003 0.6	
uoride n Balance (Calculation)	1.5		mg/L %	0.24 66.3	0.27 90	0.3	
trate as N	10		mg/L	<0.1	<0.1	<0.1	
trite as N	1		mg/L	<0.2	<0.05	<0.2	
Phosphase as P		6.5 - 8.5	mg/L pH	<0.05 7.46	<0.05 7.76	<0.05	
-Saturation ica-Reactive			pH mg/L	6.47 19.7	6.36 15	7.01 20.9	
Iphate mperature			mg/L C	73.7	75.3	83.6 18.9	
tal Suspended Solids		500	mg/L	66.5	10600	15	
rdness		5 80 - 100	mg/L	4580 1400	12800 2370	5.52	
TAL METALS tal Aluminum (Al)		0.1	mg/L	32.5	55.2	0.094	
tal Antimony (Sb) tal Arsenic (As)	0.006		mg/L mg/L	0.0004	0.004	<0.0001 0.0024	
tal Barium (Ba) tal Bervilium (Be)	1		mg/L mg/l	0.382	4.11	0.0546	
al Bismuth	5		mg/L ma/l	0.0004	0.0009	<0.0001	
al Cadmium (Cd)	0.005		mg/L	0.0007	0.0048	<0.0001	
lal Chromium (Cr)	0.05		mg/L	0.053	0.0811	0.0002	
al Copper (Cu)		1	mg/L	0.0304	0.268	0.0003	
al Lead (Pb)	0.01	0.3	mg/L mg/L	0.694	2940	0.0013	
ai Litnium (Li) Ial Magnesium (Mg)			mg/L mg/L	0.0765 70.3	0.103 145	0.0117	
al Manganese (Mn) rcury (Hg)	1	0.05	mg/L mg/L	2.76 <0.05	11.4 <0.05	0.0314 <0.05	
al Molybdenum (Mo) al Nickel (Ni)			mg/L mg/L	0.0016 0.0661	0.0115 0.113	0.001	
al Potassium (K) al Selenium (Se)	0.05		mg/L mg/L	6.38 0.0002	13.4 0.0008	1.29 <0.0001	
al Silicon (Si) al Silver (Ag)			mg/L mg/L	52.1 0.0002	349 <0.0005	9.96 <0.001	
dium (Na) al Strontium (Sr)		20/200	mg/L mg/L	8.12	10.9	12.2	
al Thallium (TI) al Tin (Sn)			mg/L mg/l	0.0005	<0.002	<0.0003	
lal Titanium (Ti) lal Tungsten (W)			mg/L	0.622	0.808	0.0044	
lal Vanadium (V)	20		mg/L	0.662	3.13	0.207	
lal Zinc (Zn)		5	mg/L mg/l	0.774	6.65 0.045	0.01	
SSOLVED METALS		0.1	mall	0.0100	0.040	<0.002	
solved Antimony (Sb)	0.06	0.1	mg/L	-		<0.002	
solved Arsenic (As) solved Barium (Ba)	0.01		mg/L mg/L	-	-	0.0017	
solved Beryllium (Be) solved Bismuth			mg/L mg/L	-	-	<0.0001 <0.0001	
solved Boron (B)	5		mg/L	-	-	0.023	
solved Calcium (Ca)	0.005		mg/L	-		105	
solved Chromium (Cr) solved Cobalt (Co)	0.05		mg/L mg/L	-	-	< 0.0001	
solved Copper (Cu) solved Iron (Fe)		0.3	mg/L mg/L	-	-	0.0003	
solved Lead (Pb)	0.01		mg/L	-	-	< 0.0001	
solved Ethildin (Ef) solved Magnesium (Mg)		0.05	mg/L	-		27.2	
rcury (Hg)	1	0.05	ug/L	-		< 0.0216	
solved Molybdenum (Mo) solved Nickel (Ni)			mg/L mg/L	-	-	0.001	
solved Potassium (K) solved Selenium (Se)	0.05		mg/L mg/L	-	-	1.25	
solved Silicon (Si) solved Silver (Ag)			mg/L mg/L	-	-	9.73 <0.0001	
solved Sodium (Na)		20/200	mg/L	-		12.3	
solved Thallium (TI)			mg/L	-		<0.0003	
solved Titanium (Ti)			mg/L	-	-	0.0009	
solved tranium (U)	20		ug/L	-		0.2	
solved Zinc (Zn)		5	mg/L mg/L	-	-	<0.0001 0.006	
solved Zirconium (Zr) TRIENTS			mg/L	-	-	< 0.0004	
al Phosphorous (P) CROBIOLOGICAL / ORGANICS			mg/L	3.88	22.2	<0.010	
herichia Coli	0		MPN/100mL	0	0	0	
Dichloroethylene	0 14		MPN/100mL ug/L	0 <0.2	<0.2	0 <0.2	
Dichlorobenzene	200	-	ug/L ua/l	<0.2 <0.2	<0.2 <0.2	<0.2 <0.2	
Dichlorobenzene	5		ug/L	<0.2	<0.2	<0.2	
modichloromethane	1		ug/L ug/L	<0.2	<0.2	<0.2	
moform bon Tetrachloride	2		ug/L ua/l	<0.2 <.02	<0.2 <0.2	<0.2	
orobenzene	80		ug/L	<0.3	<0.3	<0.3	
romochloromethane			ug/L ug/L	<0.2	<0.2	<0.2	
vibenzene	50 140	_	ug/L ug/L	<0.5 <0.2	<0.5 <0.2	<0.5 <0.2	
- p-Xylene			ug/L	<0.4	<0.4	<0.4	
rachloroethylene	10		ug/L ug/L	<0.2	0.3 <0.2	<0.2	
uene al Trihalomethanes	60 100		ug/L ug/L	3.1 <0.4	1 <0.4	<0.2 <0.4	
chloroethylene	5		ug/L	<0.2	<0.2	<0.2	
1yr Unioride	1 90	-	ug/L	<0.2	<0.2	<0.2	

 Xylene

 ODWS - Ontario Drinking Water Standards

 AO/OG - Aesthetic Objective/Operational Guidelines

 (1)
 Values reported may be biased low due to overgrowth.

### Table 4: Summary of On-Site Water Quality Sampling Monitoring Well TW 3-13 Greensville Municipal Well FDG01 Replacement

ttention: Marco Silvario ity of Hamilton - Environmental Laboratory dddress: 700 Woodward Avenue, Hamilton, Ontario,	Project No.: Project Name: Sampler Initials:	T1220561.000 Municipal Well As ABC and HP				
ample ID: TW-3-13 ate and Time	ODWS	AO/OG	Units	12-Dec-22	Analysis 15-Dec-22	10-Jan-2
IORGANICS Ikalinity (Total as CaCO3)		30-500	mg/L	274	260	262.0
mmonia + Ammonium nion Sum (Calculation)			mg/L mg/L	0.03	<0.01 7.6	<0.01 7.5
romide			mg/L mg/L	274 <1 7.4	260	262.0 <0.2
hloride dour (apparent)		250	mg/L	14.3	13.5	12.9
onductivity vanide - Total	0.2		umho/cm ma/L	596	633 <0.0003	645.0
issolved Organic Carbon	15	5	mg/L mg/l	1.9	<0.4	<0.4
n Balance (Calculation)	10		%	1.7	0.4	1.7
itrate + Nitrite as N	10		mg/L	<0.1	<0.1	<0.02
Phosphase as P	1		mg/L mg/L	<0.05	<0.05	<0.01
1 1-Saturation		6.5 - 8.5	pH pH	7.58	7.82	7.86 7.03
lica-Reactive Jphate			mg/L mg/L	13.9 66.1	15.3 75.1	15.6 72.6
mperature Ital Suspended Solids		500	C mg/l	20.6	20.6	21.2
irbidity		5	NTU mg/l	3640	54.8	6.68
DTAL METALS		80 - 100	nig/L	335	339	342
tal Aluminum (Al) tal Antimony (Sb)	0.006	0.1	mg/L mg/L	0.243 0.0002	0.996	<0.0001
tal Arsenic (As) tal Barium (Ba)	0.01		mg/L mg/L	0.0024 0.0461	0.0049 0.0531	0.0007
tal Beryllium (Be) tal Bismuth			mg/L mg/L	<0.0001 <0.0001	<0.0001 <0.0001	<.00001 <0.0001
tal Cadmium (Cd)	5 0.005		mg/L mg/L	0.0003	0.014	<0.0001
tal Chromium (Ca)	0.05		mg/L mg/L	95 0.0013	95 0.0014	97.4
tal Copper (Cu)		1	mg/L mg/L	0.0038	0.0007	0.0002
tal Lead (Pb)	0.01	0.3	mg/L mg/L	7.31 0.0129	0.0164	0.0038
tal Magnesium (Mg)		0.00	mg/L mg/L	23.7	0.0109 24.6	23.6
tal Manganese (Mn) ercury (Hg)	1	0.05	mg/L mg/L	0.0665 <0.05	0.0685 <0.05	<0.0398
tal Molybdenum (Mo) tal Nickel (Ni)			mg/L mg/L	0.0009	0.0007	0.0008
tal Potassium (K) tal Selenium (Se)	0.05		mg/L mg/L	1.21 0.0005	1.45 0.0001	1.08
tal Silicon (Si) tal Silver (Ag)		00/000	mg/L mg/L	7.93	9.99 <0.0001	7.85
dium (Na) tal Strontium (Sr)		20/200	mg/L mg/L	0.425	7.94 0.445	7.6 0.95
tal Thallium (TI) tal Tin (Sn)			mg/L mg/L	0.0003	<0.0003	<0.0003
tal Titanium (Ti) tal Tungsten (W)			mg/L mg/L	0.0072	0.0294	0.0053
tal Vanadium (V) tal Zine (Zn)	20		mg/L mg/L	1.11 0.0024	0.935	0.87
		<u> </u>	mg/L	0.237	0.0011	< 0.0004
ssolved Aluminum (Al)		0.1	mg/L	-	-	<0.002
ssolved Antimony (Sb) ssolved Arsenic (As)	0.05		mg/L mg/L	-	-	0.0001
ssolved Barium (Ba) ssolved Beryllium (Be)	1		mg/L mg/L	-	-	0.0544
ssolved Bismuth ssolved Boron (B)	5		mg/L mg/L	-	-	<0.0001 0.016
ssolved Cadmium (Cd) ssolved Calcium (Ca)	0.005		mg/L mg/L	-	-	<0.0001 97.9
ssolved Chromium (Cr) ssolved Cobalt (Co)	0.05		mg/L mg/l	-	-	<0.0001
ssolved Copper (Cu)		1	mg/L mg/L	-	-	0.0013
solved Lead (Pb)	0.01	0.5	mg/L	-	-	<0.016
ssolved Lithium (Li) ssolved Magnesium (Mg)			mg/L mg/L	-	-	<0.0001 0.0108
ssolved Manganese (Mn) rcury (Hg)	1	0.05	mg/L ug/L	-	-	23.8 0.0319
ssolved Molybdenum (Mo) ssolved Nickel (Ni)			mg/L mg/L	-	-	<0.05 0.003
ssolved Potassium (K) ssolved Selenium (Se)	0.05		mg/L mg/L	-	-	1.08
solved Silicon (Si) solved Silver (Ag)			mg/L mg/L	-	-	7.77
solved Sodium (Na) solved Strontium (Sr)		20/200	mg/L mg/L	-	-	7.91
ssolved Thallium (TI) ssolved Tin (Sn)			mg/L mg/L	-	-	<0.0003
solved Titanium (Ti) solved Tungsten (W)			mg/L mg/L	-	-	0.0007
solved Uranium (U) solved Vanadium (V)	20		ug/L mg/L	-	-	0.873
ssolved Zinc (Zn) ssolved Zirconium (Zr)		5	mg/L ma/L	-	-	0.013
ITRIENTS	+	1	-0- ma/l	0.24	0.063	0.0004
Solved Phosphorus (P)			mg/L	-	0.063	<0.018
cherichia Coli	0		MPN/100mL	0	0	0
-Dichloroethylene	0 14		MPN/100mL ug/L	<0.2	0 <0.2	13 <0.2
-Dichlorobenzene -Dichloroethane	200		ug/L ug/L	<0.2 <0.2	<0.2 <0.2	<0.2
-Dichlorobenzene	5		ug/L	<0.2	<0.2	<0.2
omodichloromethane	1		ug/L	<0.2	<0.2	<0.2
rbon Tetrachloride	2		ug/L ug/L	<0.2	<0.2 <0.2	<0.2 <0.2
lorobenzene	80		ug/L ug/L	<0.3 <0.2	<0.2 <0.2	<0.3 <0.2
promochloromethane	50		ug/L	<0.2	<0.2	<0.2
nylbenzene	50		ug/L ug/L	<0.5	<0.5 <0.2	<0.5
p-Xylene (ylene			ug/L ug/L	<0.4 <0.2	<0.4	<0.4 <0.2
trachloroethylene luene	10 60		ug/L ua/l	<0.2 <0.2	<0.2 <0.2	<0.2 <0.2
tal Trihalomethanes	100		ug/L	<0.4	<0.4	<0.4
nyl Chloride	<u> </u>		ug/L ug/L	<0.2	<0.2	<0.2
/lene	90		ug/L	< 0.5	<0.5	< 0.5

#### Table 4: Summary of On-Site Water Quality Sampling Monitoring Well MW 101 Greensville Municipal Well FDG01 Replacement

Client: Hamilton Water Attention: Marco Silvario City of Hamilton - Environmental Laboratory Adddress: 700 Woodward Avenue, Hamilton, Ontario, LBH 6PR	Work Completed By: Project No.: Project Name: Sampler Initials:	Terraprobe Inc Stoney Creek T1220561.000 Muricipal Well Assessment ABC and HP					
Sample ID: MW101 Date and Time	ODWS	A0/OG	Units	12-Dec-22	Analysis 15-Dec-22	10-Jan-23	
INORGANICS Akalinity (Total as CaCO3)		30-500	mgL	296	274	276.0	
Ammonia + Ammonium Anion Sum (Calculation)			mgL mgL	<0.01 6.9	<0.01	<0.01	
Bicarbonate as Carbonate (Calculation) Bromide Cation Sum (Calculation)			mgL mgL	296 <1 22.0	274 <1 7	276.0 <0.2 6.0	
Chloride Colour (apparent)		250 5	mg/L CU	2.5	3.6	2.2	
Conductivity Cyanide - Total	0.2		umho/cm mg/L	554 <0.003	557 <0.003	553.0 <0.003	
Dissolved Organic Carbon Fluoride	1.5	5	mgL mgL	1.9 0.11	<0.4 0.11	<0.4 0.1	
Ion Balance (Calculation) Nitrate as N	10		% mglL	53.9 1.06	3.2	4.8	
Nitrate + Nitrite as N Nitrite as N	1		mgL mgL	<0.05	1.08	1.1 <0.01	
o-Phosphase as P PH		6.5 - 8.5	pH	<0.05	<0.05 7.84	<0.05	
PH-Saturation Silica-Reactive			mg/L	6.63 5.99	7.02	14.4	
Suprate Temperature			rngr. C	27.5 20.4	26.2 21	25.3	
Turbidity		5	NTU	1870 874	169 87.3	2.24	
TOTAL METALS		80 - 100	mgr∟	825	305	286	
Total Auminum (A) Total Antimony (Sb)	0.006	0.1	mgL mgL	31.6	3.74 0.0003	0.101 <0.0001	
Total Bardium (Ba)	1		mgL mgl	0.391	0.1	0.0702	
Total Bismuth Total Boron (B)	5		mgL mgL	0.0004 0.032	<0.0001 0.013	<0.0001 0.011	
Total Cadmium (Cd) Total Calcium (Ca)	0.005		mgL mgL	0.0004 259	<0.0001 93.6	<0.0001 88.2	
Total Chromium (Cr) Total Cobalt (Co)	0.05		mgL mgL	0.056	0.006	0.0015 <0.0001	
Total Copper (Cu) Total Iron (Fe)	0.01	0.3	mgiL mgiL	64.3 0.0330	5.81 0.00314	0.161	
Total Lithium (Li) Total Manesium (Mn)	0.01		mgL mgl	0.0503	0.0102	0.0056	
Total Manganese (Mn) Mercury (Hg)	1	0.05	mğt. mgt	2.3 <0.05	0.213 <0.05	0.0034 <0.05	
Total Molybdenum (Mo) Total Nickel (Ni)			mgL mgL	0.0023 0.0547	0.0003	0.0002	
Total Potassium (K) Total Selenium (Se)	0.05		mgL mgL	7.08	2.09	0.93	
Total Silver (Ag) Sodium (Na)		20/200	mgiL mgiL	37.5 0.0002 5.97	13.2 <0.0001 4.67	0.8 <0.0001 4.44	
Total Strontium (Sr) Total Thalium (TI)		20/200	mgL mgL	0.52	0.258	0.225	
Total Tin (Sn) Total Titanium (Ti)			mgL mgL	0.0031	0.0002	<0.0001 0.0094	
Total Tungsten (W) Total Uranium (U)	20		mgt. mgt.	0.0001	<0.0001 0.368	<0.0001 0.322	
Total Zinc (Zn) Total Zinc (Zn)		5	mgL mgL	0.0636	0.0071 0.026	0.0004 <0.001	
DISSOLVED METALS Dissolved Aluminum (Al)		01	mat	0.008	0.001	~0.0004	
Dissolved Antimony (Sb) Dissolved Antimony (Sb)	0.06	0.1	mgL mgl		-	<0.0001	
Dissolved Pareline (Pa)	1		mgL			0.0002	
Dissolved Brisnuth Dissolved Brisnuth Dissolved Boron (R)	5		mgL			<0.0001	
Dissolved Cadmium (Cd) Dissolved Cadmium (Cd) Dissolved Cadmium (Cd)	0.005		mg/L mg/L			<0.0001	
Dissolved Chromium (Cr) Dissolved Cobalt (Co)	0.05		mg/L mg/L			0.0008	
Dissolved Copper (Cu) Dissolved Iron (Fe)		1	mgL mgL			0.0013	
Dissolved Lead (Pb) Dissolved Lithium (Li)	0.01		mgL mgL			<0.0001 0.0054	
Dissolved Magnesium (Mg) Dissolved Manganese (Mn)		0.05	mg/L mg/L			14.8	
Mercury (Hg) Dissolved Molybdenum (Mo)	1		ugiL mgiL			<0.05	
Dissolved Nickel (Ni) Dissolved Potassium (K)			mgL mgL			0.0001	
Dissolved Selenium (Se) Dissolved Silicon (Si)	0.05		mgL mgL			0.0004 6.75	
Dissolved Silver (Ag) Dissolved Sodium (Na)		20/200	mgL mgL			<0.0001 4.36	
Dissolved Thallum (TI) Dissolved Thallum (TI) Dissolved Tin (Sn)			mgL mgL			<0.0003	
Dissolved Titanium (Ti) Dissolved Tungsten (W)			mg/L mg/L			0.0005	
Dissolved Uranium (U) Dissolved Vanadium (V)	20		ugL mgL			0.326	
Dissolved Zinc (Zn) Dissolved Zirconium (Zr)		5	mgL mgL			0.001	
NUTRIENTS Total Phosphorous (P)			mglL	1.9	0.161	<0.01	
MICROBIOLOGICAL / ORGANICS Escherichia Coli	0		MPN/100mL	0	0	0	
Coliform 1,1-Dichloroethylene	0 14		MPN/100mL ug/L	<0.2	<0.2	<0.2	
1,2-Dichlorobenzene 1,2-Dichloroethane	200		ugL ugL	<0.2	<0.2	<0.2	
1,4-Dichlorobenzene Benzene	5		ugL ugL	<0.2	<0.2	<0.2	
Bromodichioromethane Bromoform			ugL ugL	<0.2	<0.2	<0.2	
Carbon Tetrachloride Chlorobenzene	2 80		ugL ugL	<0.2	<0.2	<0.2	
Chloroform Dibromochloromethane			ugiL ugiL	<0.2	<0.2	<0.2	
Ethybenzene	50 140		ugiL ugiL	<0.5	<0.5 0.2	<0.5 <0.2	
m+p-Xylene o-Xylene			ugiL ugiL	<0.4	1	<0.4	
Tetrachioroethylene Toluene	10 60		ugiL ugiL	<0.2	<0.2	<0.2 <0.2	
Total Trihalomethanes Trichloroethylene	100 5		ugL ugL	<0.4	<0.4 <0.2	<0.4 <0.2	
Vinyl Chloride Xylene	1 90		ugiL ugiL	<0.2	<0.2 1.6	<0.2 <0.5	
2,3,4,5,-Tetrachlorophenol 2,4,6-Trichlorophenol2,4-D	100 5		ugiL ugiL				
2,4,-Dochlorophenol Alanchlor	900 5		ugiL ugiL				
Atrazine Atrazine+Desethyl-atrazine	5		ugiL ugiL				
Azinephos-methyl Benzo(a)pyrene	20 0.01		ugiL ugiL				
Bromate Bromoxynil	10 5		mgL ugL				
Carbaryl Carbofuran	90 90		ugiL ugiL				
Chlorite	1		mgL mgL			-	
Chlorpyrifos Desethyl-atrazine	90		ugiL ugiL	-		-	
Diazinon Dicamba	20 120		ugL ugL				
Diclofop-methyl Dimethoate	9 20		ugiL ugiL				
Diqate Diuron	70 150		mgL ugL				
Glyphosate Gross Alpha	280		mg/L Bq/L	-	-		
Gross Beta Haloacetic Acids	80		Bg/L up/L	-	-	-	
Malathion MCPA	190 0.1		ugL upL	-	-		
Metolachlor Metribuzin	50 80		ugL upL	-	-	-	
NDMA Nitrilotriacetic Acid	0.009		mgL mgL				
Paraquat Total PCBs	10 3		mgL upL	-	-		
Pentachiorophenol Phorate	60 20		ugt_ upt_			-	
Picloram Prometryne	190 1		ugt_ uat			-	
Simazine Terbufos	10		ugt		-	-	
Total Toxic Equivalencey Trialitie	220		pg/L	-	-		
Trifurain	45		ugit. ugit.	-	-		
Caffiene Micorcystins			ugL	<0.5	-		
,							

Project T1220561.000

### Table 5: Summary of Off-Site Water Quality Municipal Well FDG01 Greensville Municipal Well FDG01 Replacement

Client: Hamilton Water		Work Completed By:	Terraprobe Inc S	Stoney Creek
Attention: Marco Silvario		Project No.:	T1220561.000	
City of Hamilton - Environmental Laboratory		Project Name:	Municipal Well As	sessment
Sample ID: EDG01	PN	Sampler muals.		
	ODWS	AO/OG	Units	Analysis
Date and Time	02110		0	15-Dec-22
INORGANICS				
Alkalinity (Total as CaCO3)		30-500	mg/L	373
Ammonia + Ammonium			mg/L	<0.01
Anion Sum (Calculation)			mg/L	296
Bicarbonate as Carbonate (Calculation)			mg/L	-
Bromide			mg/L	-
Cation Sum (Calculation)		250	mg/L	-
Colour (apparent)		250	IIIg/L CU	-
Conductivity		, v	umbo/cm	1730
Cvanide - Total	0.2		ma/L	<0.03
Dissolved Organic Carbon		5	ma/L	0.7
Fluoride	1.5		ma/L	0.11
Ion Balance (Calculation)			%	-
Nitrate as N	10		mg/L	7.22
Nitrate + Nitrite as N			mg/L	-
Nitrite as N	1		mg/L	<0.01
o-Phosphase as P			mg/L	-
pH		6.5 - 8.5	pН	7.67
pH-Saturation			pН	-
Silica-Reactive			mg/L	-
Sulphate			mg/L	63.3
Temperature			С	-
Total Suspended Solids		500	mg/L	-
Turbidity		5	NTU	0.12
Hardness		80 - 100	mg/L	511
TOTAL METALS				
Total Aluminum (AI)		0.1	mg/L	< 0.002
Total Antimony (Sb)	0.006		mg/L	<0.0001
Total Arsenic (As)	0.01		mg/L	<0.0001
Total Barium (Ba)	1		mg/L	0.167
Total Beryllium (Be)			mg/L	<0.0001
Total Bismuth	5		mg/L mg/l	<0.0001
Total Cadmium (Cd)	0.005		mg/L	<0.043
Total Calcium (Ca)	0.000		mg/L	160
Total Chromium (Cr)	0.05		mg/L	0.0002
Total Cobalt (Co)			mg/L	< 0.0001
Total Copper (Cu)		1	mg/L	0.0007
Total Iron (Fe)		0.3	mg/L	< 0.003
Total Lead (Pb)	0.01		mg/L	<0.0001
Total Lithium (Li)			mg/L	0.0099
Total Magnesium (Mg)		0.05	mg/L	27.1
Moreuru (Ha)	4	0.05	mg/L	<0.0001
Total Molybdenum (Mo)	1		mg/L	<0.05
Total Nickel (Ni)			mg/L mg/l	0.0002
Total Potassium (K)			mg/L	2.26
Total Selenium (Se)	0.05		mg/L	0.0003
Total Silicon (Si)			mg/L	6.36
Total Silver (Ag)			mg/L	<0.0001
Sodium (Na)		20/200	mg/L	163
Total Strontium (Sr)			mg/L	1
Total Tin (Sp)			mg/L	<0.0003
Total Titanium (Ti)		1	mg/L	<0.0001
Total Tungsten (W)	-	1	ma/L	<0.0001
Total Uranium (U)	20		mg/L	0.708
Total Vanadium (V)			mg/L	<0.0001
Total Zinc (Zn)		5	mg/L	0.007
Total Zirconium (Zr)			mg/L	<0.0004
NUTRIENTS				
Total Phosphorous (P)			mg/L	<0.01
	0	_	MPN/100mL	0
Coliform	0		MPN/100mL	0
	14	_	ug/L	<0.2
1,2-Dichlorobenzene	200		ug/L	<0.2
1,2-Dichloroethane	5		ug/L	<0.2
1,4-Dichlorobenzene	5		ug/L	<0.2
Benzene	1		ug/L	<0.2
Bromodichloromethane			ug/L	<0.2
Bromotorm		-	ug/L	<0.2
Carbon Letrachloride	2		ug/L	<0.2
Chlorobenzene	80		ug/L	<0.3
Chloroform			ug/L	0.4
Dibromochloromethane			ug/L	<0.2
Dichloromethane	50		ug/L	<0.5
Ethylbenzene	140		ug/L	<0.2
m+p-Xylene			ug/L	<0.4
o-Xylene			ug/L	<0.2
Tetrachloroethylene	10		ug/L	<0.2
Toluene	60		ug/L	<0.2
Total Trihalomethanes	100		ug/L	0.4
Trichloroethylene	5		ug/L	<0.2
Vinyl Chloride	1		ug/L	<0.2
Xvlene	90		ug/L	<0.5

### Table 5: Summary of Off-Site Water Quality Sampling Surface Water Monitoring Greensville Municipal Well FDG01 Replacement

Client: Hamilton Water		Work Completed By:	Terraprobe Inc S	Stoney Creek	
Attention: Marco Silvario		Project No.:	T1220561.000		
City of Hamilton - Environmental Laboratory Adddress: 700 Woodward Avenue, Hamilton, Ontario, 1.8H 6I	PN	Project Name: Sampler Initials:	ABC and HP	sessment	
Sample ID: Tews Falls - Surface Water	N .	oumpier mitials.	Abo and th		
	ODWS	AO/OG	Units	Ana	lysis
Date and Time				13-Dec-22	15-Dec-22
INORGANICS					
Alkalinity (Total as CaCO3)		30-500	mg/L	183	203
Ammonia + Ammonium			mg/L	0.18	0.12
Anion Sum (Calculation)			mg/L	25.9	21.9
Bicarbonate as Carbonate (Calculation)			mg/L	183	203
Bromide Cation Sum (Calculation)			mg/L	1.1	25.2
Chloride		250	mg/L	171	167
Colour (apparent)		5	CU	358	2850
Conductivity			umho/cm	2110	1850
Cyanide - Total	0.2		mg/L	< 0.003	< 0.003
Dissolved Organic Carbon		5	mg/L	2.5	3.6
Fluoride	1.5		mg/L	0.68	0.57
Ion Balance (Calculation)			%	1.3	7.12
Nitrate as N	10		mg/L	2.86	2.06
Nitrate + Nitrite as N			mg/L	2.86	2.06
Nitrite as N	1		mg/L	<0.05	<0.05
o-Phosphase as P			mg/L	< 0.05	<0.05
pH		6.5 - 8.5	pН	8.02	7.94
pH-Saturation			pH	6.91	6.88
Silica-Reactive			mg/L	16.5	4.39
Sulphate		1	mg/L	803	614
Temperature			С	21.7	20.5
Total Suspended Solids		500	mg/L	185	1360
Turbidity		5	NTU	66.4	592
Hardness		80 - 100	mg/L	1040	1010
TOTAL METALS					
Total Aluminum (AI)		0.1	mg/L	0.308	4.14
Total Antimony (Sb)	0.006		mg/L	0.0004	0.0004
Total Arsenic (As)	0.01		mg/L	0.0006	0.003
Total Barium (Ba)	1		mg/L	0.0537	0.0764
Total Bismuth			mg/L	<0.0001	0.0002
Total Boron (B)	5		mg/L	0.261	0.0001
Total Cadmium (Cd)	0.005		mg/L	0.0002	0.0009
Total Calcium (Ca)			mg/L	268	262
Total Chromium (Cr)	0.05		mg/L	0.0005	0.0058
Total Cobalt (Co)			mg/L	0.0005	0.0046
Total Copper (Cu)		1	mg/L	0.0022	0.0168
Total Iron (Fe)		0.3	mg/L	0.539	7.28
Total Lead (Pb)	0.01		mg/L	0.0122	0.0926
Total Lithium (Li)			mg/L	0.0534	0.0465
Total Magnesium (Mg)		0.05	mg/L mg/l	89.7	80.3
Mercury (Hg)	1	0.00	mg/L	<0.05	0.906
Total Molvbdenum (Mo)			mg/L	0.0483	0.0399
Total Nickel (Ni)			mg/L	0.012	0.0258
Total Potassium (K)			mg/L	21.4	18.3
Total Selenium (Se)	0.05		mg/L	0.0004	0.0006
Total Silicon (Si)			mg/L	34.7	8.9
Total Silver (Ag)		00/000	mg/L	<0.0001	<0.0001
Sodium (Na)		20/200	mg/L	81.9	81.6
Total Strontium (Sr)			mg/L	9.62	7.43
Total Tin (Sn)		1	mg/L	<0.0004	0.000 A000.0
Total Titanium (Ti)		1	ma/L	0.0068	0.0789
Total Tungsten (W)		1	mg/L	<0.0001	<0.0001
Total Uranium (U)	20		mg/L	10.5	7.64
Total Vanadium (V)			mg/L	0.0011	0.0102
Total Zinc (Zn)		5	mg/L	0.267	0.902
		1	mg/L	<0.0004	0.001
NUTRIENTS		1			0.070
			mg/L	0.04	0.372
Easteriatia Cali	0		MDNI/400mal	40	
	0		MDN/400ml	10	20
Collionn 4.4 Disklass that as	0		WPN/TOUTIL	1960	3650
	14		ug/L	<0.2	<0.2
1,2-Dichloropenzene	200		ug/L	<0.2	<0.2
	5		ug/L	<0.2	<0.2
	5		ug/L	<0.2	<0.2
	1		ug/L	<0.2	<0.2
Diomodicniorometnane		+	ug/L	<0.2	<0.2
Bromotorm			ug/L	<0.2	<0.2
Carbon Letrachloride	2		ug/L	<0.2	<0.2
Chlorobenzene	80		ug/L	<0.3	<0.3
Chlorotorm			ug/L	<0.2	<0.2
Dibromochloromethane			ug/L	<0.5	<0.2
Dichloromethane	50		ug/L	<0.2	<0.5
Ethylbenzene	140		ug/L	<0.4	<0.2
m+p-Xylene			ug/L	<0.2	<0.4
o-Xylene			ug/L	<0.2	<0.2
Tetrachloroethylene	10		ug/L	<0.2	<0.2
Toluene	60		ug/L	<0.2	<0.2
Total Trihalomethanes	100		ug/L	<0.4	<0.4
Trichloroethylene	5		ug/L	<0.2	<0.2
Vinyl Chloride	1		ug/L	<0.2	<0.2
Xylene	90		ug/L	<0.5	<0.5

### Table 5: Summary of Off-Site Quality Sampling 3 Medwin Drive Greensville Municipal Well FDG01 Replacement

Client: Hamilton Water	Work Completed By:	Terraprobe Inc S	Stoney Creek		
Attention: Marco Silvario		Project No.:			
City of Hamilton		Project Name:	Municipal Well As	sessment	
Environmental Laboratory		Sampler Initials:	ABC and HP		
/UU Woodward Avenue, Hamilton, Ontario, L8H 6PN		2 Martuia D.			
Monitoring Location Address		3 Medwin Drive			
Sample ID	ODWR		Unite	Δnal	veie
Date	ODW3	A0/0G	onita	1-Dec-22	15-Dec-22
INORGANICS					
Alkalinity (Total as CaCO3)		30-500	ma/l	317	289.0
Ammonia + Ammonium		30-300	mg/L	0.01	<0.1
Anion Sum (Calculation)			me/L	10.5	10.0
Bicarbonate as Carbonate (Calculation)			mg/L	317	289.0
Bromide			mg/L	<0.2	<1
Cation Sum (Calculation)			me/L	9.7	9.7
Chloride		250	mg/L	79.9	80.6
Colour (apparent)		5	CU	65	18.0
Conductivity			umho/cm	930	886.0
Cyanide - Total	0.2		mg/L	<.003	< 0.003
Dissolved Organic Carbon		5	mg/L	1	0.7
Fluoride	1.5		ma/L	0.28	0.3
Ion Balance (Calculation)			%	4	1.3
Nitrate as N	10		mg/L	1.78	1.6
Nitrate + Nitrite as N			mg/L	1.78	1.61
Nitrite as N	1		mg/L	< 0.01	< 0.05
o-Phosphase as P			ma/L	<0.05	<0.05
ρH		6.5 - 8.5	рН	7.8	7.79
pH-Saturation			ьН	6.91	6.95
Silica-Reactive			ma/l	13.2	12 7
Sulnhate		ł	mg/L	68.5	70.6
Temperature		+		21.2	20.0
Total Supponded Solida		500		21.3	20.3
rotar Suspended Solids		500	mg/L	22.1	<5 4.40
i urbiaity		5	NIU	17.4	4.12
Hardness		80-100	mg/L	390	397
METALS					
Total Aluminum (AI)		0.1	mg/L	0.02	0.006
Total Antimony (Sb)	0.06		mg/L	<0.0001	0.0002
Total Arsenic (As)	0.01		mg/L	0.0003	0.0004
Total Barium (Ba)	1		mg/L	0.0693	0.061
Total Beryllium (Be)			mg/L	< 0.0001	< 0.0001
Total Bismuth			mg/L	<0.0001	<0.0001
Total Boron (B)	5		mg/L	0.025	0.029
Total Cadmium (Cd)	0.005		mg/L	< 0.0001	< 0.0001
Total Calcium (Ca)			mg/L	113	118
Total Chromium (Cr)	0.05		mg/L	0.0004	0.0002
Total Cobalt (Co)			mg/L	<0.0001	<0.0001
Total Copper (Cu)		1	mg/L	0.0079	0.0034
Total Iron (Fe)		0.3	mg/L	0.813	1.21
Total Lead (Pb)	0.01		mg/L	0.0024	0.0024
Total Lithium (Li)			mg/L	0.0102	0.0117
Total Magnesium (Mg)			mg/L	26.1	24.9
Total Manganese (Mn)		0.05	mg/L	0.0122	0.0239
Mercury (Hg)	1		ug/L	< 0.05	< 0.05
Total Molybdenum (Mo)			mg/L	0.0012	0.0012
Total Nickel (Ni)			mg/L	0.0019	0.0016
Total Potassium (K)			mg/L	< 0.0010	2.08
Total Selenium (Se)	0.05		mg/L	0.0002	0.0003
Total Silicon (Si)			mg/L	6.14	6.38
Total Silver (Ag)			mg/L	< 0.0001	< 0.0001
Sodium (Na)		20/200	mg/L	40.8	37.9
Total Strontium (Sr)			mg/L	1.56	1.48
Total Thallium (TI)			mg/L	< 0.003	< 0.0003
Total Tin (Sn)			mg/L	0.0011	0.0005
I otal I itanium (Ti)			mg/L	0.0007	0.0006
I otal I ungsten (W)			mg/L	<0.00001	<0.0001
rotar ofanlum (U) Total Vanadium (V)	20		ug/L	1.49	1.42
I otal Vanadium (V)		-	mg/L	0.0001	<0.0001
rotar∠inc (∠n) Total Zircenium (Zr)		5	mg/L	0.001	0.043
I diai zirconium (zr)			mg/L	<0.0004	<0.0004
		1			-0.010
			mg/L	-	<0.010
	•			0	0
Escherichia Coli	0		MPN/100mL	0	0
	0		WPN/100mL	108	461
1,1-Dichloroethylene	14		ug/L	<0.2	<0.2
1,2-Dichlorobenzene	200		ug/L	<0.2	<0.2
1,2-Dichloroethane	5		ug/L	<0.2	<0.2
1,4-Dichlorobenzene	5		ug/L	<0.2	<0.2
Benzene	1		ug/L	<0.2	<0.2
Bromodichloromethane			ug/L	<0.2	<0.2
Bromoform			ug/L	<0.2	<0.2
Carbon Tetrachloride	2	1	ug/L	<0.2	<0.2
Chlorobenzene	80		ug/L	<0.3	<0.3
Chloroform			ua/L	<0,02	<0.2
Dibromochloromethane			 uo/l	<0.2	<0.2
Dichloromethane	50	ł	ug/L	<0.5	<0.2 <0.5
Ethylhonzono	30		ug/L	-0.0	-0.0
	140		ug/L	<u.2< td=""><td><u.2< td=""></u.2<></td></u.2<>	<u.2< td=""></u.2<>
m+p-Ayiene		+	ug/L	<u.4< td=""><td>&lt;0.4</td></u.4<>	<0.4
o-Xyiene			ug/L	<0.2	<0.2
I etrachloroethylene	10		ug/L	<0.2	<0.2
loluene	60		ug/L	<0.2	<0.2
Total Trihalomethanes	100		ug/L	<0.4	<0.4
Trichloroethylene	5		ug/L	<0.2	<0.2
Vinyl Chloride	1		ug/L	<0.2	<0.2
Xvlene	90		ua/L	<0.5	<0.5

### Table 5: Summary of Off-Site Water Quality Sampling 15 Medwin Drive Greensville Municipal Well FDG01 Replacement

Client: Hamilton Water	Work Completed By:	Terraprobe Inc S	Stoney Creek		
Attention: Marco Silvario		Project No.:	T1220561.000		
Environmental Laboratory		Sampler Initials:	ABC and HP	sessment	
700 Woodward Avenue, Hamilton, Ontario, L8H 6PN					
Monitoring Location Address		15 Medwin Drive			
Sample ID	ODWS	15 Medwin Drive	Units	Δna	lvsis
Date	ODW3	A0/0G	onito	12-Dec-23	15-Dec-23
INORGANICS					
Alkalinity (Total as CaCO3)		30-500	mg/L	303	306
Ammonia + Ammonium			mg/L	<0.01	<0.01
Anion Sum (Calculation) Bicarbonate as Carbonate (Calculation)			me/L mg/l	11./ 303	12.1
Bromide			mg/L	<1	<1
Cation Sum (Calculation)			me/L	10.9	11.8
Chloride		250	mg/L	104	113
Colour (apparent)		5	CU umbo/om	4	13
Conductivity Cvanide - Total	0.2		mg/L	<0.003	<0.003
Dissolved Organic Carbon		5	mg/L	0.8	0.8
Fluoride	1.5		mg/L	0.59	0.58
Ion Balance (Calculation)			%	3.7	1.3
Nitrate as N	10		mg/L	1.23	1.31
Nitrate + Nitrite as N	1		mg/L	1.23	1.31
o-Phosphase as P	-		mg/L	<0.05	<0.05
pH		6.5 - 8.5	pH	7.49	7.56
pH-Saturation			pH	6.88	6.86
Silica-Reactive			mg/L	13.7	13.4
Sulphate			mg/L	109	110
Temperature			С	20.9	20.7
Total Suspended Solids		500	mg/L	<3	4
l urbidity Hardness		5	NIU mg/l	0.69	2.28
		001-08	IIIg/L	403	435
Total Aluminum (Al)		0.1	ma/L	0.002	0.01
Total Antimony (Sb)	0.06		mg/L	<0.0001	< 0.0001
Total Arsenic (As)	0.01		mg/L	<0.0001	0.0002
Total Barium (Ba)	1		mg/L	0.0714	0.0707
Total Beryllium (Be)			mg/L	< 0.0001	< 0.0001
Total Bismuth	5		mg/L	<0.0001	<0.0001
Total Cadmium (Cd)	0.005		mg/L	<0.0001	0.0001
Total Calcium (Ca)			mg/L	134	143
Total Chromium (Cr)	0.05		mg/L	0.0002	0.0007
Total Cobalt (Co)			mg/L	<0.0001	0.0004
Total Copper (Cu)		1	mg/L	0.0213	0.0789
Total Lead (Pb)	0.01	0.3	mg/L	0.002	0.0018
Total Lithium (Li)	0.01		mg/L	0.143	0.0016
Total Magnesium (Mg)			mg/L	31.2	33.6
Total Manganese (Mn)		0.05	ug/L	0.0078	0.0654
Mercury (Hg)	1		mg/L	<0.05	<0.05
Total Molybdenum (Mo)			mg/L	0.0014	0.0012
Total Nickei (Ni) Total Potassium (K)			mg/L	2.63	2.7
Total Selenium (Se)	0.05		mg/L	<0.0001	<0.0001
Total Silicon (Si)			mg/L	6.27	6.59
Total Silver (Ag)		20/200	mg/L	< 0.0001	< 0.0001
Sodium (Na) Total Strontium (Sr)		20/200	mg/L	<u>33</u> 4 92	<u>37.7</u> 5.17
Total Thallium (TI)			mg/L	<0.0003	< 0.0003
Total Tin (Sn)			mg/L	< 0.0001	0.0012
Total Titanium (Ti)			mg/L	< 0.0004	0.0007
Total Uranium (U)	20		mg/L	2.23	2.39
Total Vanadium (V)			mg/L	0.0001	0.0001
Total Zinc (Zn)		5	mg/L	0.098	0.171
Total Zirconium (Zr)			mg/L	<0.0004	<0.0004
NUIRIENIS Total Phosphorus (P)			mg/l	<0.010	<0.010
MICROBIOLOGICAL / ORGANICS			IIIg/L	<0.010	\$0.010
Escherichia Coli	0		MPN/100mL	0	0
Coliform	0		ug/L	0	16
1,1-Dichloroethylene	14		ug/L	<0.2	<0.2
1,2-Dichlorobenzene	200		ug/L	<0.2	<0.2
1,2-Dichloroethane	5		ug/L	<0.2	<0.2
1,4-Dichlorobenzene	5		ug/L	<0.2	<0.2
Bromodichloromethane	1		ug/L	<0.2	<0.2
Bromoform			ug/L ug/L	<0.2	<0.2
Carbon Tetrachloride	2		ug/L	<0.2	<0.2
Chlorobenzene	80		ug/L	<0.3	<0.3
Chloroform			ug/L	<0.2	<0.2
Dibromochloromethane			ug/L	<0.2	<0.2
Dichloromethane	50		ug/L	<0.5	<0.5
Etnyidenzene	140		ug/L	<0.2	<0.2
	ļ		ug/L	<0.4	<0.4
Tetrachloroethylene	10	ł	ug/L	<0.2	<0.2
Toluene	60		ua/L	<0.2	<0.2
Total Trihalomethanes	100		ug/L	<0.4	<0.4
Trichloroethylene	5		ug/L	<0.2	<0.2
Vinyl Chloride	1		ug/L	<0.2	<0.2
Xvlene	90		ua/l	<0.5	<0.5

### Table 5: Summary of Off-Site Water Quality Samplig 609 Harvest Road Greensville Muncipal Well FDG01 Replacement

Client: Hamilton Water	Work Completed By: Terraprobe Inc Stoney Creek									
City of Hamilton	Project No.: Project Name:	Municipal Well Assessment								
Environmental Laboratory		Sampler Initials:	tials: ABC and HP							
700 Woodward Avenue, Hamilton, Ontario, L8H 6PN	609 Harvest Road (13 Medwin Drive)									
Sample ID		609 Harvest Road (13 609 Harvest Road	Medwin Drive)							
	ODWS	AO/OG	Units	Ana	alysis					
INORGANICS				12-Dec-23	15-Dec-23					
Alkalinity (Total as CaCO3)		30-500	mg/L	308	302					
Ammonia + Ammonium Anion Sum (Calculation)			mg/L me/L	<0.01	<0.01					
Bicarbonate as Carbonate (Calculation)			mg/L	308	302					
Bromide			mg/L	<0.2	<1					
Cation Sum (Calculation)		250	me/L	8.8	10					
Colour (apparent)		230	IIIg/L	00.5 44	32					
Conductivity			umho/cm	895	886					
Cyanide - Total	0.2		mg/L	< 0.003	< 0.003					
Dissolved Organic Carbon		5	mg/L	1.2	0.7					
Fluoride	1.5		mg/L	0.44	0.48					
Ion Balance (Calculation)	10		%	6.9	0.5					
Nitrate + Nitrite as N	10		mg/L	1.34	1.28					
Nitrite as N	1		mg/L	<0.01	<0.05					
o-Phosphase as P			mg/L	<0.05	<0.05					
pH		6.5 - 8.5	pH	7.74	7.72					
pH-Saturation			pH	6.94	6.91					
Silica-Reactive			mg/L	13	13.2					
Sulphate			mg/L	76.9	81.7					
Temperature		<b>F60</b>	C	22.3	20.6					
Turkidity		500	mg/L	44.4	19					
Hardness		5 80.100	NIU ma/l	12.8	6.64					
METALS	1	00-100	iiig/L	3.03	420					
Total Aluminum (Al)	1	0.1	ma/L	0.057	0.19					
Total Antimony (Sb)	0.06		mg/L	<0.0001	0.0002					
Total Arsenic (As)	0.01		mg/L	0.0004	0.001					
Total Barium (Ba)	1		mg/L	0.0659	0.0707					
Total Beryllium (Be)			mg/L	< 0.0001	< 0.0001					
Total Bismuth	-		mg/L	< 0.0001	<0.0001					
Total Cadmium (Cd)	0.005		mg/L	<0.001	0.000					
Total Calcium (Ca)	0.005		mg/L	103	122					
Total Chromium (Cr)	0.05		mg/L	0.0009	0.0008					
Total Cobalt (Co)			mg/L	0.0012	0.0031					
Total Copper (Cu)		1	mg/L	0.005	0.0089					
Total Iron (Fe)		0.3	mg/L	1.61	2.65					
Total Lead (Pb)	0.01		mg/L	0.0024	0.0064					
Total Lithium (Li) Total Magnesium (Mg)			mg/L	27.4	28					
Total Maganese (Mn)		0.05	mg/L	0.0755	0.191					
Mercury (Hg)	1		ug/L	<0.05	<0.05					
Total Molybdenum (Mo)			mg/L	0.0014	0.0014					
Total Nickel (Ni)			mg/L	0.0037	0.0068					
Total Polassium (K)	0.05		mg/L	0.0002	0.0003					
Total Silicon (Si)	0.00		mg/L	5.96	6.99					
Total Silver (Àg)			mg/L	<0.0001	<0.0001					
Sodium (Na)		20/200	mg/L	26.8	29.8					
Total Strontium (Sr)			mg/L	3.88	3.62					
Total Tin (Sn)			mg/L	0.0039	0.0003					
Total Titanium (Ti)			mg/L	0.0016	0.0064					
Total Tungsten (W)			mg/L	,0.0001	<0.0001					
Total Vanadium (V)	20		ug/L	2.02	1.96					
Total Zinc (Zn)	1	5	ma/L	0.004	0.134					
Total Zirconium (Zr)			mg/L	< 0.0004	< 0.0004					
NUTRIENTS	-	·	- <u> </u>	-						
Total Phosphorus (P)			mg/L	0.011	0.022					
				<u>^</u>	<u>^</u>					
Coliform	0		MPN/100mL	U	0					
1.1-Dichloroethylene	14			<0.2	<0.2					
1.2-Dichlorobenzene	200		ua/L	<0.2	<0.2					
1,2-Dichloroethane	5		ug/L	<0.2	<0.2					
1,4-Dichlorobenzene	5		ug/L	<0.2	<0.2					
Benzene	1		ug/L	<0.2	<0.2					
Bromodichloromethane			ug/L	<0.2	<0.2					
Bromoform			ug/L	<0.2	<0.2					
Carbon Tetrachloride	2		ug/L	<0.2	<0.2					
Chlorobenzene	80		ug/L	<0.3<0.2	<0.3					
Chioroform Dibromochloromethanc		+	ug/L	<0.2	<0.2					
Dichloromethane	50		ug/L	<0.2 <0.5	<0.2					
Ethylbenzene	140		ug/L	<0.2	<0.2					
m+p-Xylene	270		ua/L	<0.4	<0.4					
o-Xylene	1	1	ug/L	<0.2	<0.2					
Tetrachloroethylene	10		ug/L	<0.2	<0.2					
Toluene	60		ug/L	<0.2	<0.2					
Total Trihalomethanes	100		ug/L	<0.4	<0.4					
Trichloroethylene	5		ug/L	<0.2	<0.2					
Vinyl Chloride	1		ug/L	<0.2	<0.2					
луюне	90	1	ug/L	<0.5	<0.5					

### Table 2: Summary of Ground Water Quality Analysis 63 Tews Lane Hamilton, Ontario

Client: Hamilton Water		Work Completed By:	Work Completed By: Terraprobe Inc Stoney Creek								
Attention: Marco Silvario		Project No.: Project Name:	T1220561.000 Municipal Well Asi								
Environmental Laboratory		Sampler Initials:	ABC and HP								
700 Woodward Avenue, Hamilton, Ontario, L8H 6PN											
Monitoring Location Address	63 Tews Lane										
Sample ID	63 Tews Lane	Ulaita	Á no	voio							
Dato	ODWS	AO/OG	Units	Ana 1-Doc-22	15 Doc-22	16 May 23					
INORGANICS				1-Dec-22	13-Dec-22	10-Way-23					
Alkalinity (Total as CaCO3)		30-500	ma/L	280	274	269					
Ammonia + Ammonium			mg/L	0.03	0.04	0.04					
Anion Sum (Calculation)			me/L	9.4	9.2	9					
Bicarbonate as Carbonate (Calculation)			mg/L	280	274	269					
Bromide			mg/L	<0.2	<1	<0.2					
Cation Sum (Calculation)		250	me/L	8.3	9.1	8.0 38.1					
Colour (apparent)		230	CU	40.0	40.5	26					
Conductivity		5	umho/cm	796	780	775					
Cvanide - Total	0.2		ma/L	< 0.003	< 0.003	< 0.003					
Dissolved Organic Carbon		5	mg/L	1.1	0.6	0.6					
Fluoride	1.5		mg/L	0.31	0.31	0.32					
Ion Balance (Calculation)			%	5.8	0.6	2.2					
Nitrate as N	10		mg/L	0.02	<0.1	<002					
Nitrate + Nitrite as N			mg/L	<0.03	<0.2	<0.03					
Nitrite as N	1		mg/L	<0.01	<0.05	<0.01					
o-Phosphase as P			mg/L	<0.05	<0.05	<005					
pH		6.5 - 8.5	pН	7.82	7.49	7.82					
pH-Saturation			pH	7.02	6.98	6.97					
Silica-Reactive			mg/L	21.8	21.2	21.5					
		ł	mg/L	96.5	97	94.2					
Tetel Supported Solid-		500	C	21.6	20.3	22.3					
Turbidity		500	mg/L	96	9.7	<1					
l urbiaity		5	NIU m=//	108	11.2	2.19					
		80-100	mg/L	363	399	366					
	1	0.1	ma/l	0.062	0.400	<0.000					
Total Antimony (Sh)	0.06	0.1	mg/∟	0.003	0.109 <0.0001	<0.002					
Total Antimotify (SD)	0.08		mg/L	<0.0001	0.0001	<0.0001					
Total Arsenic (As)	0.01		mg/L	0.0544	0.0146	0.0019					
Total Bendlium (Be)	1		mg/L	<0.0044	<0.0001	<0.0001					
Total Bismuth			mg/L	< 0.0001	<0.0001	<0.0001					
Total Boron (B)	5		mg/L	0.028	0.027	0.026					
Total Cadmium (Cd)	0.005		mg/L	<0.0001	< 0.0001	<0.0001					
Total Calcium (Ca)			mg/L	96.8	113	109					
Total Chromium (Cr)	0.05		mg/L	0.0004	0.0002	< 0.0001					
Total Cobalt (Co)			mg/L	0.0001	0.0002	<0.0001					
Total Copper (Cu)		1	mg/L	0.0011	0.0007	0.0002					
Total Iron (Fe)		0.3	mg/L	2.94	6.91	0.83					
Total Lead (Pb)	0.01		mg/L	0.0006	0.0012	0.0001					
Total Lithium (Li)			mg/L	0.0106	0.012	0.0117					
Total Magnesium (Mg)		0.05	mg/L	29.6	28.4	27.7					
Mercury (Ha)	1	0.05	ing/L	<0.0401	<0.05	<0.0234					
Total Molybdenum (Mo)	-		mg/L	0.0011	0.0011	0.0011					
Total Nickel (Ni)			mg/L	0.0009	0.0006	0.0002					
Total Potassium (K)			mg/L	1.33	1.28	1.26					
Total Selenium (Se)	0.05		mg/L	<0.0001	<0.0001	<0.0001					
Total Silicon (Si)			mg/L	9.5	11.9	10.3					
Total Silver (Ag)		20/200	mg/L	<0.0001	< 0.0001	< 0.0001					
Sodium (Na) Total Strantium (Sr)		20/200	mg/L	17	15.6	15.6					
Total Strontum (SI)			mg/L	<0.003	<0.003	<0.20					
Total Tin (Sn)	1	1	mg/L	0.0015	0.0004	< 0.0001					
Total Titanium (Ti)			mg/L	0.0038	0.0046	0.0006					
Total Tungsten (W)			mg/L	<0.0001	<0.0001	<0.0001					
Total Uranium (U)	20		ug/L	0.151	0.167	0.167					
I otal vanadium (V) Total Zinc (Zn)		5	mg/L	0.0002	0.0003	<0.0001					
Total Zirconium (Zr)		5	mg/L	<0.000	<0.012	<0.013					
NUTRIENTS			ilig/E	-0.0004	-0.0004	40.0004					
Total Phosphorus (P)			mg/L	0.011	0.051	<0.010					
MICROBIOLOGICAL / ORGANICS											
Escherichia Coli	0		MPN/100mL	0	0	0					
Coliform	0		MPN/100mL	9	10	0					
1,1-Dichloroethylene	14		ug/L	<0.2	<0.2	<0.2					
1,2-Dichlorobenzene	200		ug/L	<0.2	<0.2	<0.2					
1,2-Dichloroethane	5		ug/L	<0.2	<0.2	<0.2					
1,4-Dichlorobenzene	5		ug/L	<0.2	<0.2	<0.2					
Benzene	1		ug/L	<0.2	<0.2	<0.2					
Bromodichloromethane			ug/L	<0.2	<0.2	<0.2					
Bromoform			ug/L	<0.2	<0.2	<0.2					
Carbon Tetrachloride	2		ug/L	<0.2	<0.2	<0.2					
Chlorobenzene	80		ug/L	<0.3	<0.3	<0.3					
Chloroform			ug/L	<0.2	<0.2	<0.2					
Dibromochloromethane			ug/L	<0.2	<0.2	<0.2					
Dichloromethane	50		ug/L	<0.5	<0.5	<0.5					
Ethylbenzene	140		ug/L	<0.2	<0.2	<0.2					
m+p-Xylene		ļ	ug/L	<0.4	<0.4	<0.4					
o-Xylene			ug/L	<0.2	<0.2	<0.2					
Tetrachloroethylene	10		ug/L	<0.2	<0.2	<0.2					
Toluene	60		ug/L	<0.2	<0.2	<0.2					
I otal I rihalomethanes	100		ug/L	<0.4	<0.4	<0.4					
	5		ug/L	<0.2	<0.2	<0.2					
vinyi Unioride	1	-	ug/L	<0.2	<0.2	<0.2					
Aylene	90		ug/L	<0.5	<0.5	<0.5					

## Table 6: Summary of Field Quality Sampling - TW 2-13Greensville Municipal Well FDG01 ReplacementHamilton, Ontario

Date & time Cr)Perturn (PC)Reduce (Pr)Conductivity (Pr)Disolved (Pr)Disolved (Pr)12/13/2021 1:009.227.257.91.030.06.830.63112/13/2021 1:0011.037.341220.9880.01.170.63112/13/2021 1:0011.037.2410.01.00.00.00.00.012/13/2021 1:0011.017.2410.01.00.0				Oxidation			Dssolved	Total			
CC         Potential (m)         (ms/cm) (ms)         (ms/cm) (ms/cm)         (ms/cm) (ms/cm) (ms/cm)         (ms/cm) (ms/cm) (ms/cm)           12/13/2022 11:00         11.77         7.37         122         0.981         0         1.1.7         6.638           12/13/2022 11:00         11.07         7.24         1.06         1         0         8.41         0.638           12/13/2022 13:00         11.07         7.24         1.016         1         0         9.83         0.653           12/13/2022 15:00         7.58         8.06         1.36         1.007         0         1.365         0.668           12/13/2022 17:00         6.52         7.11         1.11         1.00         1.31.20         0.31.25         0.727           12/13/2022 18:00         4.55         7.71         1.122         1.14         0         1.32.2         0.73           12/13/2022 19:00         4.5         7.72         1.12         1.41         0         1.33         0.773           12/13/2022 19:00         4.55         7.74         1.40         1.18         0         1.55         0.814           12/14/2022 10:00         3.21         7.73         1.55         1.11         0         1.15	Date & time	Temperature	nH	Reduction	Conductivity	Turbidity	Oxygen	Dissolved			
(mg/)         (mg/)         (mg/)         (mg/)           17/13/2022 11:00         11.78         7.37         1122         0.988         0         11.7         0.681           12/13/2022 11:00         11.03         7.34         114         0.971         0         12.1         0.621           12/13/2022 13:00         11.07         7.24         106         1         0         9.83         0.653           12/13/2022 15:00         7.58         8.66         136         1.07         0         13.55         0.654           12/13/2022 16:00         6.99         7.01         1212         1.16         0         13.36         0.764           12/13/2022 18:00         4.5         7.13         119         1.13         0         13.50         7.73           12/13/2022 19:00         3.47         7.17         112         1.16         0         13.39         0.735           12/13/2022 19:00         3.2         7.13         119         1.13         0         13.39         0.735           12/13/202 21:00         3.2         7.14         140         1.18         0         15.63         0.725           12/14/202 2:00         3.2         7.16	(°C)		pri	Potential	(ms/cm)	(NTU)	(mg/L)	Solids			
12/13/2022 10:00       9:22       7.25       79       1.03       0       6.89       0.66         12/13/2022 12:00       14.03       7.34       122       0.988       0       11.7       0.631         12/13/2022 13:00       11.07       7.24       106       1       0       8.41       0.653         12/13/2022 13:00       7.58       8.06       136       1.07       0       13.85       0.653         12/13/2022 15:00       7.52       8.06       136       1.07       0       13.89       0.668         12/13/2022 15:00       4.5       7.13       119       1.13       0       13.62       0.727         12/13/2022 19:00       4.05       7.72       112       1.14       0       13.31       0.733         12/13/2022 29:00       3.74       7.72       1143       141       0       15.53       0.732         12/14/2022 29:00       3.21       7.74       140       1.18       0       15.53       0.722         12/14/202 29:00       3.21       7.74       140       1.18       0       15.63       0.722         12/14/202 29:00       3.21       7.74       140       1.18       0       15.63				(mV)			(116/ 5/	(mg/L)			
12/13/2022 11:00       11.78       7.37       122       0.988       0       11.7       0.661         12/13/2022 13:00       11.07       7.24       106       1       0       8.41       0.633         12/13/2022 13:00       11.07       7.24       106       1       0       8.41       0.633         12/13/2022 15:00       5.59       8.66       136       1.07       0       13.65       0.664         12/13/2022 15:00       5.62       7.11       121       1.06       0       13.89       0.668         12/13/2022 18:00       4.5       7.13       119       1.13       0       13.26       0.727         12/13/2022 19:00       3.46       7.77       112       1.14       0       13.39       0.73         12/13/2022 2:00       3.24       7.71       122       1.14       0       13.39       0.73         12/14/202 2:00       3.21       7.43       119       1.18       0       15.57       0.81         12/14/202 2:00       3.21       7.74       142       1.20       11.9       0.727         12/14/202 2:00       3.25       7.33       142       1.2       0       1.47       0.727	12/13/2022 10:00	9.22	7.25	79	1.03	0	6.89	0.66			
12/13/2022       12:00       14:03       7:34       124       0.971       0       12:1       0.62         12/13/2022       13:00       11.07       7.74       110       11       0       8:41       0.633         12/13/2022       16:00       6:39       7.01       121       1.06       0       13:89       0.668         12/13/2022       17:00       5:62       7.11       121       1.11       0       14:04       0.733         12/13/2022       19:00       4:05       7.27       112       1.15       0       13:21       0.733         12/13/2022       29:00       3:74       7.77       122       1.14       0       13:32       0.931         12/13/2022       29:00       2:55       7.43       119       1.28       0       15:63       0.782         12/14/2022       0:0       3:21       7.14       140       1.18       0       15:63       0.782         12/14/2022       0:0       3:21       7.14       140       1.18       0       16:63       0.792         12/14/2022       0:0       3:27       7:2       165       1.16       0       16:78       0.757	12/13/2022 11:00	11.78	7.37	122	0.988	0	11.7	0.631			
12/13/2021 13:00       11.07       7.24       106       1       0       8.41       0.633         12/13/2021 15:00       7.58       8.06       136       1.07       0       13.65       0.684         12/13/2021 15:00       6.59       7.01       121       1.06       0       13.89       0.668         12/13/2021 15:00       6.52       7.11       121       1.1       0       14.01       0.74         12/13/2022 19:00       4.05       7.27       112       1.15       0       13.21       0.733         12/13/2022 29:00       -2       7.12       14.4       0       13.39       0.785         12/14/2022 20:00       -2.5       7.38       142       1.23       0       13.39       0.785         12/14/2022 20:0       -2.5       7.38       142       1.23       0       11.9       0.752         12/14/202 2:00       3.27       7.2       165       1.12       0       11.9       0.752         12/14/202 2:00       3.57       7.2       165       1.16       0       16.78       0.757         12/14/202 2:00       3.57       7.23       152       1.22       0       21.61       0.772	12/13/2022 12:00	14.03	7.34	124	0.971	0	12.1	0.62			
12/13/2022       11       7.21       111       1.1       0       9.8       0.653         12/13/2022       16:00       6:99       7.01       121       1.06       0       13.89       0.68         12/13/2022       17:00       5.62       7.11       121       1.16       0       13.89       0.68         12/13/2022       19:00       4.05       7.27       112       1.15       0       13.21       0.733         12/13/2022       21:00       -2       7.12       144       1.41       0       13.3       0.73         12/13/2022       21:00       -2       7.12       144       1.41       0       13.3       0.73         12/14/2022       21:00       -2       7.38       142       1.28       0       15.75       0.84         12/14/2022       20:00       3.21       7.14       1.44       1.18       0       16.63       0.72         12/14/2022       0       3.21       7.14       1.44       1.18       0       16.78       0.727         12/14/2022       0       3.57       7.2       1.65       1.16       0       1.71       0.727         12/14/2022	12/13/2022 13:00	11.07	7.24	106	1	0	8.41	0.639			
12/13/2022 15:00       7.58       8.06       136       1.07       0       13.89       0.68         12/13/2022 17:00       5.62       7.11       121       1.1       0       14.01       0.74         12/13/2022 18:00       4.5       7.3       119       1.13       0       13.65       0.72         12/13/2022 19:00       4.05       7.27       112       1.14       0       13.32       0.733         12/13/2022 20:00       -2       7.12       143       1.41       0       13.52       0.901         12/13/2022 20:00       -2.5       7.43       119       1.28       0       13.52       0.901         12/14/2022 1:00       3.2       7.19       152       1.12       0       1.19       0.752         12/14/2022 2:00       3.21       7.19       152       1.12       0       1.13       0.752         12/14/2022 1:00       3.57       7.2       165       1.16       0       16.78       0.777         12/14/2022 1:00       3.57       7.2       151       1.2       0       21.17       0.772         12/14/2022 1:00       3.74       1.52       1.12       0       21.17       0.772	12/13/2022 14:00	11	7.21	111	1.1	0	9.83	0.653			
12/13/2022       6.99       7.01       121       1.06       0       14.01       0.74         12/13/2022       18:00       4.5       7.13       119       1.13       0       13.65       0.727         12/13/2022       19:00       4.05       7.71       112       1.15       0       13.21       0.73         12/13/2022       20:00       3.74       7.17       112       1.14       0       13.33       0.73         12/13/2022       20:00       3.74       7.12       143       1.41       0       13.52       0.901         12/13/2022       20:00       2.55       7.38       142       1.23       0       13.39       0.785         12/14/2022       3.00       3.21       7.14       140       1.18       0       15.63       0.792         12/14/2022       3.01       3.21       7.13       152       1.12       0       7.43       0.757         12/14/2022       3.02       3.14       7.2       145       1.16       0       1.678       0.757         12/14/2022       3.03       7.52       1.42       0       2.177       0.733       1.21       0       2.171       0.757<	12/13/2022 15:00	7.58	8.06	136	1.07	0	13.65	0.684			
12/13/2022       5.62       7.11       121       1.1       0       14.01       0.74         12/13/2022       19:00       4.05       7.27       112       1.15       0       13.21       0.733         12/13/2022       20:00       3.74       7.17       112       1.14       0       13.3       0.73         12/13/2022       20:00       3.74       7.17       112       1.14       0       13.3       0.73         12/13/2022       21:00       -2.5       7.43       119       1.28       0       15.53       0.814         12/14/2022       20:00       3.21       7.14       1440       1.18       0       15.63       0.792         12/14/2022       3:00       3.57       7.2       165       1.12       0       7.13       0.752         12/14/2022       3:00       3.57       7.2       165       1.16       0       16.78       0.757         12/14/2022       3:00       3.57       7.2       147       1.21       0       21.17       0.772         12/14/2022       3:0       3.73       1.52       1.22       0       21.61       0.72         12/14/202       1:00<	12/13/2022 16:00	6.99	7.01	121	1.06	0	13.89	0.68			
12/13/2022       18:00       4.5       7.13       119       1.13       0       13.65       0.727         12/13/2022       0.00       3.74       7.17       112       1.14       0       13.21       0.733         12/13/2022       0.02       2.7.12       143       1.44       0       13.52       0.901         12/13/2022       22:00       -2.5       7.43       119       1.28       0       15.75       0.814         12/14/2022       0:0       3.21       7.14       140       1.18       0       15.63       0.785         12/14/2022       0:0       3.21       7.19       152       1.2       0       11.9       0.752         12/14/2022       3.00       3.57       7.2       165       1.12       0       7.43       0.727         12/14/2022       3.00       3.57       7.21       147       1.0       19.47       0.737         12/14/2022       3.00       3.57       7.23       155       1.12       0       21.10       0.727         12/14/2022       3.00       3.27       7.23       152       1.22       0       21.61       0.72         12/14/2022       3	12/13/2022 17:00	5.62	7.11	121	1.1	0	14.01	0.74			
12/13/2022 19:00       4.05       7.27       112       1.15       0       13.21       0.73         12/13/2022 21:00       -2       7.12       143       1.41       0       13.32       0.901         12/13/2022 22:00       -2.5       7.43       119       1.28       0       13.53       0.901         12/14/2022 2:00       -2.5       7.48       142       1.23       0       13.39       0.785         12/14/2022 1:00       3.21       7.14       140       1.18       0       15.63       0.792         12/14/2022 1:00       3.21       7.14       140       1.18       0       7.63       0.737         12/14/2022 2:00       3.57       7.7       165       1.12       0       7.43       0.727         12/14/2022 5:00       2.85       7.3       159       1.17       0       19.47       0.737         12/14/202 5:00       2.85       7.34       153       1.22       0       24.19       0.765         12/14/202 7:00       2.33       7.24       162       1.21       0       10.57       0.778         12/14/202 1:00       3.65       7.29       160       1.2       0       1.10	12/13/2022 18:00	4.5	7.13	119	1.13	0	13.65	0.727			
12/13/2022 20:00       3.74       7.17       122       1.14       0       13.3       0.73         12/13/2022 21:00       -2.5       7.74       119       1.28       0       15.75       0.814         12/13/2022 23:00       3.21       7.14       140       1.18       0       15.63       0.732         12/14/2022 1:00       3.21       7.14       140       1.18       0       15.63       0.732         12/14/2022 1:00       3.27       7.19       152       1.12       0       11.9       0.752         12/14/2022 2:00       4.98       7.07       165       1.16       0       16.78       0.757         12/14/2022 4:00       3.14       7.2       147       1.21       0       21.17       0.772         12/14/2022 5:00       2.85       7.3       159       1.17       0       19.47       0.737         12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/202 8:00       2.24       7.34       153       1.2       0       21.49       0.766         12/14/202 1:00       3.65       7.11       166       1.13       0       11	12/13/2022 19:00	4.05	7.27	112	1.15	0	13.21	0.733			
12/13/2022 21:00       -2       7.12       143       1.41       0       13.52       0.901         12/13/2022 23:00       -2.5       7.43       119       1.28       0       15.75       0.834         12/13/2022 23:00       2.55       7.38       142       1.23       0       13.39       0.785         12/14/2022 100       3.21       7.19       152       1.2       0       11.9       0.752         12/14/2022 200       4.98       7.07       165       1.12       0       7.43       0.727         12/14/2022 300       3.57       7.2       165       1.16       0       16.78       0.752         12/14/2022 500       2.85       7.3       159       1.17       0       19.47       0.737         12/14/2022 600       1.93       7.26       149       1.21       0       24.19       0.766         12/14/2022 800       2.24       7.34       153       1.22       0       21.61       0.727         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.8       0.745         12/14/2022 10:00       3.65       7.29       160       1.2       0       1.48 <td< td=""><td>12/13/2022 20:00</td><td>3.74</td><td>7.17</td><td>122</td><td>1.14</td><td>0</td><td>13.3</td><td>0.73</td></td<>	12/13/2022 20:00	3.74	7.17	122	1.14	0	13.3	0.73			
12/13/2022 22:00       -2.5       7.43       119       1.28       0       15.75       0.814         12/14/2022 2:00       2.55       7.38       142       1.23       0       13.39       0.785         12/14/2022 1:00       3.21       7.14       140       1.18       0       15.63       0.782         12/14/2022 2:00       4.98       7.07       165       1.12       0       7.43       0.727         12/14/2022 3:00       3.57       7.2       165       1.16       0       16.78       0.757         12/14/2022 6:00       3.14       7.2       147       1.21       0       21.17       0.772         12/14/2022 6:00       1.93       7.26       149       1.21       0       23.9       0.765         12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/202 8:00       2.44       7.44       162       1.21       0       10.76         12/14/202 1:00       3.65       7.29       160       1.12       0       11.48       0.743         12/14/202 1:00       6.73       7.13       102       1.12       10.43       0.721	12/13/2022 21:00	-2	7.12	143	1.41	0	13.52	0.901			
12/13/2022 23:00       2.55       7.38       142       1.23       0       13.39       0.785         12/14/2022 1:00       3.21       7.14       140       1.18       0       15.63       0.792         12/14/2022 1:00       3.22       7.19       152       1.2       0       1.19       0.732         12/14/2022 1:00       3.57       7.2       165       1.16       0       16.78       0.757         12/14/2022 4:00       3.14       7.2       147       1.21       0       21.17       0.737         12/14/2022 6:00       1.93       7.26       149       1.21       0       23.9       0.765         12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/2022 8:00       3.65       7.99       160       1.2       0       10.57       0.778         12/14/2022 1:00       3.65       7.13       102       1.12       0       12.27       0.718         12/14/2022 1:00       6.63       7.39       160       1.2       0       14.8       0.729         12/14/2022 1:00       6.45       7.13       102       1.12       0       14.50	12/13/2022 22:00	-2.5	7.43	119	1.28	0	15.75	0.814			
12/14/2022 0:00       3.2       7.19       152       1.2       0       11.9       0.752         12/14/2022 1:00       3.2       7.19       152       1.2       0       7.43       0.727         12/14/2022 1:00       3.57       7.2       165       1.16       0       16.78       0.757         12/14/2022 5:00       3.57       7.2       165       1.16       0       16.78       0.772         12/14/2022 5:00       2.85       7.3       159       1.17       0       19.47       0.737         12/14/2022 6:00       1.93       7.26       149       1.21       0       23.9       0.765         12/14/2022 8:00       2.24       7.34       152       1.22       0       24.19       0.766         12/14/2022 8:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.743         12/14/2022 10:00       7.65       7.11       16       1.13       0       11       0.723         12/14/2022 10:00       6.73       7.34       117       1.14       0       14.88       0.	12/13/2022 23:00	2.55	7.38	142	1.23	0	13.39	0.785			
12/14/2022 1:00       3.2       7.19       152       1.2       0       11.9       0.752         12/14/2022 3:00       3.57       7.2       165       1.12       0       7.43       0.772         12/14/2022 3:00       3.14       7.2       147       1.21       0       21.17       0.772         12/14/2022 5:00       2.85       7.3       159       1.17       0       19.47       0.733         12/14/2022 6:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/2022 8:00       2.24       7.34       153       1.2       0       24.19       0.766         12/14/202 10:00       3.65       7.29       160       1.2       0       11.48       0.743         12/14/202 13:00       6.45       7.11       16       1.13       0       11       0.723         12/14/202 13:00       7.83       7.17       95       1.11       0       14.48       0.764         12/14/202 13:00       8.17       7.19       116       1.1       0       14.70       0.76	12/14/2022 0:00	3.21	7.14	140	1.18	0	15.63	0.792			
12/14/2022 2:00       4.98       7.07       165       1.12       0       7.43       0.727         12/14/2022 3:00       3.57       7.2       165       1.16       0       16.78       0.737         12/14/2022 4:00       3.14       7.2       147       1.21       0       23.9       0.755         12/14/2022 6:00       1.93       7.26       149       1.21       0       23.9       0.765         12/14/2022 8:00       2.37       7.23       152       1.22       0       21.61       0.765         12/14/2022 8:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.743         12/14/2022 10:00       3.65       7.29       160       1.12       0       12.27       0.718         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 13:00       6.73       7.34       117       1.14       0       14.63       0.721         12/14/2022 13:00       7.87       7.15       136       1.11       0       14.64	12/14/2022 1:00	3.2	7.19	152	1.2	0	11.9	0.752			
12/14/2022 3:00       3.57       7.2       165       1.16       0       16.78       0.757         12/14/2022 3:00       3.14       7.2       147       1.21       0       21.17       0.737         12/14/2022 5:00       2.85       7.3       159       1.17       0       19.47       0.737         12/14/2022 5:00       2.37       7.23       152       1.22       0       21.61       0.765         12/14/2022 9:00       3.724       162       1.21       0       10.57       0.778         12/14/2022 9:00       3.65       7.29       160       1.2       0       11.48       0.745         12/14/2022 19:00       7.65       7.13       102       11.2       0       12.27       0.738         12/14/2022 19:00       7.63       7.34       117       1.14       0       15.83       0.721         12/14/202 19:00       6.73       7.34       117       1.14       0       14.58       0.721         12/14/202 19:00       7.46       7.31       119       1.11       0       14.45       0.721         12/14/202 19:00       7.46       7.31       119       1.11       0       14.50       0.754 <td>12/14/2022 2:00</td> <td>4.98</td> <td>7.07</td> <td>165</td> <td>1.12</td> <td>0</td> <td>7.43</td> <td>0.727</td>	12/14/2022 2:00	4.98	7.07	165	1.12	0	7.43	0.727			
12/14/2022 4:00       3.14       7.2       147       1.21       0       21.17       0.737         12/14/2022 6:00       2.85       7.3       159       1.17       0       19.47       0.737         12/14/2022 6:00       2.33       7.23       152       1.22       0       21.61       0.72         12/14/2022 8:00       2.24       7.34       153       1.2       0       24.19       0.765         12/14/2022 10:00       3       7.72       160       1.2       0       11.48       0.745         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.745         12/14/2022 10:00       7.05       7.13       102       1.12       0       12.27       0.718         12/14/2022 13:00       6.73       7.74       117       1.4       0       14.03       0.721         12/14/2022 16:00       7.46       7.3       129       1.11       0       14.63       0.724         12/14/2022 16:00       7.46       7.3       129       1.11       0       14.64       0.754         12/14/2022 16:00       7.83       7.15       136       1.11       0       14.5	12/14/2022 3:00	3.57	7.2	165	1.16	0	16.78	0.757			
12/14/2022 5:00       2.85       7.3       159       1.17       0       19.47       0.737         12/14/2022 6:00       1.93       7.26       149       1.21       0       23.9       0.765         12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/2022 9:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.743         12/14/2022 11:00       6.45       7.11       116       1.13       0       11       0.723         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.63       0.721         12/14/2022 15:00       7.44       7.31       119       1.1       0       14.64       0.722         12/14/2022 15:00       7.66       7.5       125       1.12       0       14.5       0.754         12/14/2022 16:00       7.83       7.15       136       1.11       0       14.64	12/14/2022 4:00	3.14	7.2	147	1.21	0	21.17	0.772			
12/14/2022 6:00       1.93       7.26       149       1.21       0       23.9       0.765         12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/2022 8:00       2.24       7.34       153       1.2       0       24.19       0.766         12/14/2022 9:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.723         12/14/2022 12:00       7.05       7.13       102       1.12       0       12.27       0.718         12/14/2022 12:00       6.73       7.34       117       1.14       0       14.83       0.729         12/14/2022 13:00       6.73       7.34       117       1.14       0       14.63       0.721         12/14/2022 15:00       8.17       7.19       116       1.11       0       14.64       0.722         12/14/2022 16:00       7.87       7.15       136       1.11       0       14.57       0.754         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.5	12/14/2022 5:00	2.85	7.3	159	1.17	0	19.47	0.737			
12/14/2022 7:00       2.37       7.23       152       1.22       0       21.61       0.72         12/14/2022 8:00       2.24       7.34       153       1.2       0       24.19       0.766         12/14/2022 9:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 11:00       6.45       7.11       16       1.13       0       11       0.723         12/14/2022 12:00       7.05       7.13       102       1.12       0       12.27       0.718         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 14:00       7.83       7.17       95       1.11       0       14.63       0.721         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.57       0.714         12/14/2022 19:00       7.66       7.5       125       1.11       0       14.64       0.722         12/14/2022 19:00       6.6       7.5       122       0       14.5       0.759         12/14/2022 19:00       6.6       7.5       122       0       14.5       0.754         <	12/14/2022 6:00	1.93	7.26	149	1.21	0	23.9	0.765			
12/14/2022 9:00       2.24       7.34       153       1.2       0       24.19       0.766         12/14/2022 9:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 10:00       3.65       7.29       160       1.12       0       11.48       0.743         12/14/2022 12:00       7.05       7.13       102       1.12       0       12.27       0.718         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.78       0.704         12/14/2022 16:00       7.46       7.3       129       1.11       0       14.57       0.714         12/14/2022 16:00       7.44       7.31       119       1.1       0       14.57       0.744         12/14/2022 18:00       7.66       7.5       125       1.12       0       14.5       0.759         12/14/2022 19:00       6.6       7.51       123       1.18       0       16.42       0.754         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.52 <td>12/14/2022 7:00</td> <td>2.37</td> <td>7.23</td> <td>152</td> <td>1.22</td> <td>0</td> <td>21.61</td> <td>0.72</td>	12/14/2022 7:00	2.37	7.23	152	1.22	0	21.61	0.72			
12/14/2022 9:00       3       7.24       162       1.21       0       10.57       0.778         12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.745         12/14/2022 11:00       6.45       7.11       16       1.13       0       11       0.723         12/14/2022 12:00       7.05       7.13       102       1.12       0       12.27       0.718         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 14:00       7.83       7.17       95       1.11       0       14.03       0.721         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.57       0.714         12/14/2022 16:00       7.44       7.31       119       1.1       0       14.57       0.741         12/14/2022 18:00       7.87       7.15       136       1.11       0       14.5       0.759         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.5       0.754         12/14/2022 20:00       6.39       7.2       139       1.15       0       16.52	12/14/2022 8:00	2.24	7.34	153	1.2	0	24.19	0.766			
12/14/2022 10:00       3.65       7.29       160       1.2       0       11.48       0.745         12/14/2022 11:00       6.45       7.11       16       1.13       0       11       0.723         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 13:00       6.73       7.34       117       1.14       0       14.03       0.721         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.78       0.704         12/14/2022 15:00       7.44       7.31       119       1.1       0       14.57       0.714         12/14/2022 18:00       7.46       7.3       129       1.11       0       14.45       0.759         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.45       0.759         12/14/2022 19:00       6.86       7.11       121       1.16       0       15.2       0.746         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 21:00       6.63       7.2       139       1.15       0       16.52 <td>12/14/2022 9:00</td> <td>3</td> <td>7.24</td> <td>162</td> <td>1.21</td> <td>0</td> <td>10.57</td> <td>0.778</td>	12/14/2022 9:00	3	7.24	162	1.21	0	10.57	0.778			
12/14/2022 11:00       6.45       7.11       16       1.13       0       11       0.723         12/14/2022 12:00       7.05       7.13       102       1.12       0       12.27       0.718         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 14:00       7.83       7.71       95       1.11       0       14.03       0.721         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.64       0.722         12/14/2022 15:00       7.44       7.31       119       1.1       0       14.64       0.722         12/14/2022 19:00       7.66       7.5       125       1.12       0       14.5       0.754         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 20:00       6.86       7.11       121       1.16       0       15.2       0.746         12/14/2022 20:00       6.39       7.2       139       1.15       0       16.42       0.754         12/14/2022 20:00       6.16       7.18       122       1.14       0       15.3 <td>12/14/2022 10:00</td> <td>3.65</td> <td>7.29</td> <td>160</td> <td>1.2</td> <td>0</td> <td>11.48</td> <td>0.745</td>	12/14/2022 10:00	3.65	7.29	160	1.2	0	11.48	0.745			
12/14/2022 12:00       7.05       7.13       102       1.12       0       12.27       0.713         12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 14:00       7.83       7.17       95       1.11       0       14.03       0.721         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.64       0.702         12/14/2022 15:00       7.46       7.3       119       1.11       0       14.64       0.722         12/14/2022 18:00       7.44       7.31       119       1.11       0       14.64       0.722         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.5       0.759         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 20:00       6.39       7.2       139       1.15       0       16.52       0.738         12/14/2022 20:00       6.7       7.27       129       1.14       0       16.3       0.74         12/14/2022 20:00       6.7       7.27       129       1.14       0       16.3 <td>12/14/2022 11:00</td> <td>6.45</td> <td>7.11</td> <td>16</td> <td>1.13</td> <td>0</td> <td>11</td> <td>0.723</td>	12/14/2022 11:00	6.45	7.11	16	1.13	0	11	0.723			
12/14/2022 13:00       6.73       7.34       117       1.14       0       15.83       0.729         12/14/2022 14:00       7.83       7.17       95       1.11       0       14.03       0.721         12/14/2022 15:00       8.17       7.19       116       1.1       0       14.78       0.704         12/14/2022 16:00       7.46       7.31       119       1.11       0       14.57       0.714         12/14/2022 18:00       7.87       7.15       136       1.11       0       14.64       0.722         12/14/2022 19:00       6.66       7.5       125       1.12       0       14.5       0.759         12/14/2022 21:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 23:00       6.39       7.2       139       1.15       0       16.52       0.738         12/14/2022 2:00       6.7       7.27       129       1.14       0       15.84       0.731         12/14/2022 2:00       6.7       7.27       129       1.14       0       15.84       0.741         12/15/2022 0:00       6.7       7.27       129       1.14       0       13.26 <td>12/14/2022 12:00</td> <td>7.05</td> <td>7.13</td> <td>102</td> <td>1.12</td> <td>0</td> <td>12.27</td> <td>0.718</td>	12/14/2022 12:00	7.05	7.13	102	1.12	0	12.27	0.718			
12/14/2022 15:00       7.83       7.17       95       1.11       0       14.03       0.721         12/14/2022 15:00       8.17       7.19       116       1.11       0       14.78       0.704         12/14/2022 16:00       7.46       7.33       129       1.11       0       14.67       0.714         12/14/2022 17:00       7.44       7.31       119       1.1       0       14.64       0.722         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.5       0.759         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 21:00       6.86       7.11       121       1.16       0       15.2       0.738         12/14/2022 23:00       6.02       7.14       121       1.1       0       16.3       0.74         12/15/2022 0:00       6.7       7.27       129       1.14       0       15.84       0.731         12/15/2022 0:00       6.71       7.27       129       1.14       0       15.84       0.751         12/15/2022 0:00       6.16       7.18       122       1.14       0       13.26	12/14/2022 13:00	6.73	7.34	117	1.14	0	15.83	0.729			
12/14/2022 16:00       8.17       7.19       116       1.1       0       14.78       0.704         12/14/2022 16:00       7.46       7.3       129       1.11       0       14.57       0.714         12/14/2022 17:00       7.44       7.31       119       1.1       0       14.64       0.722         12/14/2022 18:00       7.87       7.15       136       1.11       0       14.7       0.76         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.5       0.759         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 21:00       6.86       7.11       121       1.16       0       15.2       0.738         12/14/2022 23:00       6.02       7.14       121       1.1       0       16.3       0.74         12/15/2022 0:00       6.7       7.27       129       1.14       0       15.84       0.731         12/15/2022 0:00       6.16       7.18       122       1.14       0       13.26       0.754         12/15/2022 0:00       6.17       7.29       1.75       1.15       0       8.49	12/14/2022 14:00	7.83	7.17	95	1.11	0	14.03	0.721			
12/14/2022 16:00       7.46       7.3       129       1.11       0       14.57       0.714         12/14/2022 17:00       7.44       7.31       119       1.1       0       14.64       0.722         12/14/2022 18:00       7.87       7.15       136       1.11       0       14.7       0.769         12/14/2022 19:00       6.6       7.5       125       1.12       0       14.5       0.759         12/14/2022 20:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/2022 21:00       6.86       7.11       121       1.16       0       15.2       0.746         12/14/2022 23:00       6.02       7.14       121       1.1       0       16.52       0.738         12/15/2022 0:00       6.7       7.27       129       1.14       0       15.84       0.731         12/15/2022 0:00       6.7       7.27       129       1.14       0       13.26       0.754         12/15/2022 1:00       5.94       7.07       125       1.16       0       12.3       0.751         12/15/2022 3:00       6.17       7.29       173       1.17       0       11.13	12/14/2022 15:00	8.17	7.19	116	1.1	0	14.78	0.704			
12/14/20211:00       7.44       7.31       119       1.1       0       14.64       0.722         12/14/20218:00       7.87       7.15       136       1.11       0       14.7       0.76         12/14/20219:00       6.6       7.5       125       1.12       0       14.5       0.759         12/14/20220:00       5.83       7.15       123       1.18       0       16.42       0.754         12/14/20221:00       6.86       7.11       121       1.16       0       15.2       0.746         12/14/20222:00       6.39       7.2       139       1.15       0       16.52       0.738         12/14/2022:00       6.02       7.14       121       1.1       0       16.3       0.74         12/14/2022:00       6.7       7.27       129       1.14       0       15.84       0.731         12/15/202:00       6.16       7.18       122       1.14       0       13.26       0.754         12/15/202:00       6.17       7.29       173       1.17       0       11.13       0.745         12/15/202:00       6.2       7.31       182       1.18       0       16.61       0.751 <td>12/14/2022 16:00</td> <td>7.46</td> <td>/.3</td> <td>129</td> <td>1.11</td> <td>0</td> <td>14.57</td> <td>0.714</td>	12/14/2022 16:00	7.46	/.3	129	1.11	0	14.57	0.714			
12/14/2022 18:007.877.151361.11014.70.7612/14/2022 19:006.667.51251.12014.50.75912/14/2022 20:005.837.151231.18016.420.75412/14/2022 21:006.867.111211.16015.20.74612/14/2022 22:006.397.21391.15016.520.73812/14/2022 23:006.027.141211.1016.30.7412/15/2022 0:006.77.271291.14015.840.73112/15/2022 0:006.77.271291.14015.840.75112/15/2022 0:006.167.181221.14013.260.75412/15/2022 0:006.167.181221.14013.260.75412/15/2022 0:006.167.181221.14013.260.75412/15/2022 0:006.177.291731.17011.130.74512/15/2022 0:006.167.181221.1408.490.72912/15/2022 0:006.247.281711.1507.960.73112/15/2022 0:006.247.281711.16019.710.74412/15/2022 0:006.37.21841.15017.710.73412/15/2022 0:006.37.21761.15017.7	12/14/2022 17:00	7.44	7.31	119	1.1	0	14.64	0.722			
12/14/2022 19:006.67.51251.12014.50.75912/14/2022 20:005.837.151231.18016.420.75412/14/2022 21:006.867.111211.16015.20.74612/14/2022 22:006.397.21391.15016.520.73812/14/2022 23:006.027.141211.1016.30.7412/15/2022 0:006.77.271291.14015.840.73112/15/2022 1:005.947.071251.16012.30.75112/15/2022 1:005.947.071251.16013.260.75412/15/2022 2:006.167.181221.14013.260.75412/15/2022 3:006.177.291731.17011.130.74512/15/2022 4:006.387.211751.1508.490.72912/15/2022 5:006.247.281711.16019.710.73412/15/2022 6:006.337.21761.15017.710.73412/15/2022 1:007.836.92881.1108.680.70812/15/2022 1:007.836.921221.12015.040.717Max Value14.08.061841.41024.190.901Min Value-2.56.92160.9706.890.	12/14/2022 18:00	7.87	7.15	136	1.11	0	14.7	0.76			
12/14/2022 20:005.837.151231.18016.420.75412/14/2022 21:006.867.111211.16015.20.74612/14/2022 23:006.027.141211.1016.30.7412/15/2022 0:006.77.271291.14015.840.73112/15/2022 1:005.947.071251.16012.30.75112/15/2022 1:005.947.071251.16013.260.75412/15/2022 1:006.167.181221.14013.260.75412/15/2022 3:006.177.291731.17011.130.74512/15/2022 4:006.387.211751.1508.490.72912/15/2022 5:006.227.311821.18016.610.75112/15/2022 6:006.427.21841.1507.960.73112/15/2022 7:006.247.281711.16019.710.74412/15/2022 1:007.836.92881.1108.680.70812/15/2022 1:007.836.921221.12015.040.717Max Value14.08.061841.41024.190.901Min Value-2.56.92160.9706.890.62	12/14/2022 19:00	6.6	7.5	125	1.12	0	14.5	0.759			
12/14/2022 21:00       6.86       7.11       121       1.16       0       15.2       0.746         12/14/2022 22:00       6.39       7.2       139       1.15       0       16.52       0.738         12/14/2022 23:00       6.02       7.14       121       1.1       0       16.3       0.74         12/15/2022 0:00       6.7       7.27       129       1.14       0       15.84       0.731         12/15/2022 1:00       5.94       7.07       125       1.16       0       12.3       0.751         12/15/2022 2:00       6.16       7.18       122       1.14       0       13.26       0.754         12/15/2022 3:00       6.17       7.29       173       1.17       0       11.13       0.745         12/15/2022 4:00       6.38       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71	12/14/2022 20:00	5.83	7.15	123	1.18	0	16.42	0.754			
12/14/2022 22:006.397.21391.15016.520.73812/14/2022 23:006.027.141211.1016.30.7412/15/2022 0:006.77.271291.14015.840.73112/15/2022 1:005.947.071251.16012.30.75112/15/2022 2:006.167.181221.14013.260.75412/15/2022 3:006.177.291731.17011.130.74512/15/2022 4:006.387.211751.1508.490.72912/15/2022 5:006.27.311821.18016.610.75112/15/2022 6:006.427.21841.1507.960.73112/15/2022 7:006.247.281711.16019.710.74412/15/2022 12:007.836.92881.1108.680.70812/15/2022 13:007.617.141211.11010.620.71312/15/2022 14:007.257.221221.12015.040.717Max Value14.08.061841.41024.190.901Min Value-2.56.92160.9706.890.62	12/14/2022 21:00	6.86	/.11	121	1.16	0	15.2	0.746			
12/14/2022 23:00       6.02       7.14       121       1.1       0       16.3       0.74         12/15/2022 0:00       6.7       7.27       129       1.14       0       15.84       0.731         12/15/2022 1:00       5.94       7.07       125       1.16       0       12.3       0.751         12/15/2022 2:00       6.16       7.18       122       1.14       0       13.26       0.754         12/15/2022 3:00       6.17       7.29       173       1.17       0       11.13       0.745         12/15/2022 4:00       6.38       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68 <t< td=""><td>12/14/2022 22:00</td><td>6.39</td><td>1.2</td><td>139</td><td>1.15</td><td>0</td><td>16.52</td><td>0.738</td></t<>	12/14/2022 22:00	6.39	1.2	139	1.15	0	16.52	0.738			
12/15/2022 0:00       0.7       7.27       125       1.14       0       15.84       0.731         12/15/2022 1:00       5.94       7.07       125       1.16       0       12.3       0.751         12/15/2022 2:00       6.16       7.18       122       1.14       0       13.26       0.754         12/15/2022 3:00       6.17       7.29       173       1.17       0       11.13       0.745         12/15/2022 4:00       6.38       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62	12/14/2022 23:00	6.02	/.14	121	1.1	0	16.3	0.74			
12/15/2022 1:00       5.94       7.07       125       1.16       0       12.3       0.751         12/15/2022 2:00       6.16       7.18       122       1.14       0       13.26       0.754         12/15/2022 3:00       6.17       7.29       173       1.17       0       11.13       0.745         12/15/2022 4:00       6.38       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04	12/15/2022 0:00	6.7	1.27	129	1.14	0	15.84	0.731			
12/15/2022 2:00       0.10       7.18       122       1.14       0       13.26       0.754         12/15/2022 3:00       6.17       7.29       173       1.17       0       11.13       0.745         12/15/2022 4:00       6.38       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19 <t< td=""><td>12/15/2022 1:00</td><td>5.94</td><td>7.07</td><td>125</td><td>1.16</td><td>0</td><td>12.3</td><td>0.751</td></t<>	12/15/2022 1:00	5.94	7.07	125	1.16	0	12.3	0.751			
12/15/2022 5:00       6.17       7.29       175       1.17       0       11.13       0.745         12/15/2022 4:00       6.38       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62 </td <td>12/15/2022 2:00</td> <td>6.16</td> <td>7.18</td> <td>122</td> <td>1.14</td> <td>0</td> <td>13.26</td> <td>0.754</td>	12/15/2022 2:00	6.16	7.18	122	1.14	0	13.26	0.754			
12/13/2022 4.00       0.380       7.21       175       1.15       0       8.49       0.729         12/15/2022 5:00       6.2       7.31       182       1.18       0       16.61       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62         Avg Value       5.8       7.23       1132       1.14       0       1.411       0.72	12/15/2022 3:00	6.17	7.29	1/3	1.1/	0	11.13	0.745			
12/15/2022 5:00       0.2       7.31       162       1.18       0       16.01       0.751         12/15/2022 6:00       6.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62         Avg Value       5.8       7.23       123       1.14       0       14.11       0.72	12/15/2022 4:00	6.38	7.21	100	1.15	0	8.49	0.729			
12/15/2022 0:00       0.42       7.2       184       1.15       0       7.96       0.731         12/15/2022 7:00       6.24       7.28       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62         Avg Value       5       7.23       132       114       0       14.11       0.72	12/15/2022 5:00	6.2	/.31	182	1.18	0	10.01	0.751			
12/15/2022 7:00       0.24       7.26       171       1.16       0       19.71       0.744         12/15/2022 8:00       6.3       7.2       176       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62         Avg Value       5.8       7.23       132       1.14       0       1.411       0.72	12/15/2022 0:00	6.42	۲.Z ۵۰ ד	171	1.15	0	10 71	0.731			
12/15/2022 0.00       0.5       7.2       170       1.15       0       17.71       0.734         12/15/2022 12:00       7.83       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62         Avg Value       58       7.23       132       1.14       0       14.11       0.72	12/15/2022 /:00	0.24	1.28	1/1	1.10	0	19.71	0.744			
12/15/2022 12:00       7.85       6.92       88       1.11       0       8.68       0.708         12/15/2022 13:00       7.61       7.14       121       1.11       0       10.62       0.713         12/15/2022 14:00       7.25       7.22       122       1.12       0       15.04       0.717         Max Value       14.0       8.06       184       1.41       0       24.19       0.901         Min Value       -2.5       6.92       16       0.97       0       6.89       0.62         Avg Value       5.8       7.23       132       1.14       0       14.11       0.73	12/15/2022 8:00	0.3	1.2	1/6	1.15	0	17.71	0.734			
12/15/2022 15:00     7.61     7.14     121     1.11     0     10.62     0.713       12/15/2022 14:00     7.25     7.22     122     1.12     0     15.04     0.717       Max Value     14.0     8.06     184     1.41     0     24.19     0.901       Min Value     -2.5     6.92     16     0.97     0     6.89     0.62       Avg Value     5.8     7.23     132     1.14     0     14.11     0.73	12/15/2022 12:00	7.83	0.92	88	1.11	0	8.08	0.708			
Izr 13/2022 14:00     Izr 12/13/2022 14:00     Izr 12/13/2022 14:00     Izr 12/13/2022 14:00     Izr 12/13/2022 14:00       Max Value     14:0     8:06     184     1.41     0     24.19     0.901       Min Value     -2.5     6:92     16     0.97     0     6:89     0.62       Avg Value     5.8     7.23     122     1.14     0     14.11     0.72	12/15/2022 13:00	7.61	/.14	121	1.11	0	10.62	0.713			
Invax value         14.0         8.00         184         1.41         0         24.19         0.901           Min Value         -2.5         6.92         16         0.97         0         6.89         0.62           Avg Value         5.8         7.23         132         1.14         0         14.11         0.72	12/13/2022 14:00	1.25	1.22	122	1.12	0	15.04	0.717			
Ivini value         -2.5         0.52         10         0.97         0         6.89         0.62           Avg Value         5.8         7.23         132         1.14         0         1.4.11         0.72	Min Value	14.0	8.06	184	1.41	0	24.19	0.901			
		-2.5	0.92	10	0.9/	0	0.89	0.02			

# Table 6: Summary of Field Quality Sampling - Monitoring WellsGreensville Municipal Well FDG01 ReplacementHamilton, Ontario

Well ID / Address	Well ID / Address Date & time Temperature pH (°C)		Oxidation Reduction Potential (mV)	Conductivity (ms/cm)	Turbidity (NTU)	Dssolved Oxygen (mg/L)	Total Dissolved Solids (mg/L)		
	12/13/2022 12:00	8.99	7.32	n/a	0.734	n/a	6.81	0.47	
	12/14/2022 10:00	7.49	7.4	68	0.771	0	5.85	0.46	
TW 1-13	12/15/2022 10:00	7.46	8.95	27	0.696	0	4.78	0.45	
	12/15/2022 18:00	7.36	6.94	140	0.7	87.2	6.21	0.448	
	TW 1-13 Average	7.8	7.7	78.3	0.7	29.1	5.9	0.5	
TW 3-13	12/13/2022 12:00	8.23	7.58	n/a	/a 7.58 n,		3.12	0.497	
	12/14/2022 11:00	8.23	7.58	45	0.82	0	5.02	0.525	
	12/15/2022 10:00	9.7	7.63	90	0.738	0	3.43	0.472	
	12/15/2022 18:00	7.92	7.34	96	0.693	43.1	0.733	0.444	
	TW 3-13 Average	8.5	7.5	77.0	2.5	14.4	3.1	0.5	
NA\N/101	12/12/2023 0:00	8.59	7.45	33	0.669	81.4 8.72		n/a	
	12/15/2023 0:00	8.14	7.06	56	0.596	41.1	8.06	0.381	
3 Medwin Drive	12/15/2023 15:30	9.16	7.19	86	0.972	0	6.03	0.624	
609 Harvest Road	12/15/2023 16:00	8.17	7.36	105	0.98	0	7.88	0.628	
15 Medwin Drive	12/15/2023 16:30	13.2	7.08	121	1.18	0	5.06	0.748	
63 Tews Lane	12/15/2023 15:00	7.03	7.45	111	0.893	9	5.2	0.571	







October 13, 2022

### Subject: Public Notice - Test Production Well Pumping Test at Johnson Tew Community Park, Greensville, Ontario

Dear Resident:

The City of Hamilton (City) is undertaking further well testing for a completed proposed municipal well installed at Johnson Tew Community Park (the Site) in Greensville. The park is located immediately north of the Greensville Public School and consists of an open field. This well testing program intends to test a bedrock well on the Site for suitability to be used as a replacement municipal production well to support the existing Greensville Municipal Well. The current well supplies a reliable source of drinking water to a community of approximately 36 homes located along Harvest Rd., Meldrum Avenue, Forest Avenue, Cedar Avenue, Birch Crescent, and Maple Crescent in Greensville, Ontario.

As part of the project, a pumping test program will be conducted over approximately a three (3) day period during the week of October 24th - 28th. Englobe has been retained to supervise the pumping test contractor and review the data. The results of the pumping test will be documented in a detailed hydrogeological report which will confirm the sustainable pumping rate of the well being tested, the interpreted radius of influence within the bedrock aquifer, and the occurrence of groundwater and/or surface water impacts.

In support of the proposed pumping test, the City has requested that Englobe conduct a water well survey in the area of the Site, which will be used to gather information on private water wells including information on well construction details and history of use. We are also requesting permission to include selected nearby private wells in the monitoring program prior to, during and after the pump test. Participation is not mandatory, and the wells selected will be dependent on interest from the property oner, location (locations adequately spaced), and well accessibility.

If you request to be included and your well is selected for participation in the program, a water level data logger will be installed in the well casing by a licensed well contractor (where required) for the period of the test. The data logger will automatically record water levels throughout the testing period. Staff from Englobe will accompany the well technician during the installation and subsequent removal of the logger and will be on site during the pump test. In addition, our staff will collect water quality samples from the private wells included within the monitoring program before and after the pump test. Results of the water quality sampling and water level monitoring will be reviewed and a letter report with the results will be provided to each resident participating within the monitoring program.

If you are interested in participating in the well monitoring program or have any questions regarding this project, please contact Marco Silverio from the City of Hamilton at (905) 546-2424 ext. 6099 or Paul Raepple

of Englobe at (519) 802-0793. To be eligible to participate we would request that you provide notification no later than October 20, 2022. We appreciate your time and cooperation in this matter.

Yours very truly,

Englobe Corp.

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Paul L. Raepple, P.Geo. Senior Project Manager/Hydrogeologist

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# Certificate of Analysis

#### **CLIENT INFORMATION**

Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

#### LABORATORY INFORMATION

Sample Date:	2022-12-12
Date Submitted:	2022-12-13

Laboratory Work Order Number: 342369

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Caffeine SPE GC/MS	Colour Spectrophotometric	Cyanide Skalar
Fluoride-PC Titrate	LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS
Silica Skalar	TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter

Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

Analyte	Result	Units	MDL	ODWS (Amnd O.Reg.457/16) Jan2020 02
Hamilton Water				
Monitoring Wells - Greensville GW - Pump Test				
TW-2-13 2022-12-12 17:00:00 Record 684300				
Alkalinity	292	ma/l	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	7.6	me/l	0.01	
Bicarbonate as Carbonate (Calculation)	292	ma/L	2	
Bromide	<1	ma/L	1	
Cation Sum (Calculation) †	7.3	me/L	0.1	
Chloride	12.6	mg/L	0.5	
Colour (apparent)	39	cŬ	2	
Conductivity	654	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	1.8	mg/L	0.4	
Fluoride	0.12	mg/L	0.04	1.5
Ion Balance (Calculation) †	1.8	%	0.1	
Nitrate as N	1.41	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.41	mg/L	0.03	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.87	pН	0.01	
pH - Saturation (Calculation) †	6.96	pН	0.01	
Silica-Reactive	14.5	mg/L	0.20	
Sulphate	44.1	mg/L	0.5	
Temperature	20.9	С	0.1	
Total Suspended Solids	3.1	mg/L	0.8	
Turbidity	6.83	NTU	0.05	
Aluminum	0.106	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0033	mg/L	0.0001	0.010
Barium	0.0932	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.018	mg/L	0.010	5.0
Cadmium	<0.0001	mg/L	0.0001	0.005
Calcium	103	mg/L	0.05	
Chromium	0.0022	mg/L	0.0001	0.05
Cobalt	0.0004	mg/L	0.0001	
Copper	0.0015	mg/L	0.0001	
Hardness (Calculation)	334	mg/L	0.3	
Iron	1.96	mg/L	0.003	
Lead	0.0043	mg/L	0.0001	0.010
Lithium	0.0068	mg/L	0.0005	
Magnesium	18.6	mg/L	0.05	
Manganese	0.0339	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0004	mg/L	0.0001	
Nickel	0.0009	mg/L	0.0001	
Phosphorus Iotal	0.019	mg/L	0.010	
Potassium	1.01	mg/L	0.05	0.05
Selenium	0.0002	mg/L	0.0001	0.05
Silicon	0.0001	mg/∟	0.01	
Silver	<0.0001	mg/L	0.0001	

Sodium

12.1

mg/L

0.05

20

Δηρινέο	Result	Unite	0 וחא	DWS (Amnd O.Reg.457/16) Jan2020 02
Analyte	0.040	5mc <sup>4</sup>	0.0005	
Strontium	0.943	mg/L	0.0005	
i nailium Tia	< 0.0003	mg/L	0.0003	
l In Tite e inse	<0.0001	mg/L	0.0001	
	0.0022	mg/L	0.0004	
Iungsten	0.0003	mg/L	0.0001	00
Uranium	0.615	ug/L	0.002	20
vanadium	0.0004	mg/L	0.0001	
	0.065	mg/L	0.001	
	<0.0004	mg/L	0.0004	<b>^</b>
Escherichia coli	0	MPN/100mL	0	0
I otal Coliform	0	MPN/100mL	0	0
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xvlene (Calculation)	<0.5	ua/L	0.5	90
Caffeine †	<0.5	ug/L	0.5	
MW-101 2022-12-12 13:00:00 Record 684301				
Alkalinity	296	mg/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) +	6.9	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	296	ma/L	2	
Bromide	<1	ma/L	-	
Cation Sum (Calculation) +	22.9	me/L	0.1	
Chloride	2.5	ma/l	0.5	
Colour (annarent)	4700	CII	2	
Conductivity	554	umbos/cm	<u>د</u> ۲	
Cyanida Total	~0 003	ma/l	0 003	0.2
Discolved Organic Carbon	<0.000 1 Ω	ma/l	0.000	0.2
	1.9 0.14	mg/L	0.4	15
Fiuoriae	52.0	111y/L	0.04	1.0
	1 06	70 mc/l	0.1	10.0
Nilitate as N Nitrota Nitrita as N. (Coloulation)	1.00	mg/L	0.02	10.0
	1.00	mg/L	0.03	1.0
INITITE AS N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
	7.50	рн	0.01	
$p_{H}$ - Saturation (Calculation) †	0.03	pH	0.01	
Silica-Reactive	5.99	mg/L	0.20	
Sulphate	27.5	mg/L	0.5	

Analuto	Recult	Inite		02	12020
Andryte	Result	Units			
	20.4	C "	0.1		
Total Suspended Solids	1870	mg/L	0.8		
Iurbidity	874	NIU m m //	0.05		
Aluminum	31.6	mg/L	0.002	0.000	
Antimony	0.0004	mg/L	0.0001	0.006	
Arsenic	0.0181	mg/L	0.0001	0.010 *	
Barium	0.391	mg/L	0.0001	1.0	
Beryllium	0.0012	mg/L	0.0001		
Bismuth	0.0004	mg/L	0.0001		
Boron	0.032	mg/L	0.010	5.0	
Cadmium	0.0004	mg/L	0.0001	0.005	
Calcium	259	mg/L	0.05		
Chromium	0.0560	mg/L	0.0001	0.05 *	
Cobalt	0.0322	mg/L	0.0001		
Copper	0.0896	mg/L	0.0001		
Hardness (Calculation)	825	mg/L	0.3		
Iron	64.3	mg/L	0.003		
Lead	0.0329	mg/L	0.0001	0.010 *	
Lithium	0.0503	mg/L	0.0005		
Magnesium	43.4	mg/L	0.05		
Manganese	2.30	mg/L	0.0001		
Mercury	<0.05	ug/L	0.05	1	
Molybdenum	0.0023	mg/L	0.0001		
Nickel	0.0547	mg/L	0.0001		
Phosphorus Total	1.90	mg/L	0.010		
Potassium	7.08	mg/L	0.05		
Selenium	0.0007	mg/L	0.0001	0.05	
Silicon	37.5	mg/L	0.01		
Silver	0.0002	mg/L	0.0001		
Sodium	5.87	mg/L	0.05	20	
Strontium	0.520	mg/L	0.0005		
Thallium	0.0005	mg/L	0.0003		
Tin	0.0031	mg/L	0.0001		
Titanium	1.17	mg/L	0.0004		
Tungsten	0.0001	mg/L	0.0001		
Uranium	0.672	ug/L	0.002	20	
Vanadium	0.0636	mg/L	0.0001		
Zinc	0.212	mg/L	0.001		
Zirconium	0.0080	mg/L	0.0004		
Escherichia coli	0	MPN/100mL	0	0	
Total Coliform	1	MPN/100mL	0	0 *	
1,1-Dichloroethvlene	<0.2	ug/L	0.2	14	
1,2-Dichlorobenzene	<0.2	ua/L	0.2	200	
1.2-Dichloroethane	<0.2	ua/L	0.2	5	
1.4-Dichlorobenzene	<0.2	ua/L	0.2	5	
Renzene	<0.2	ug/L	0.2	1	
Bromodichloromethane	<0.2	ua/l	0.2		
Rromoform	<0.2	ua/l	0.2		
Carbon Tetrachloride	~0.2	ug/L	0.2	2	
Chlorobenzene	<0.2 <0.2	ug/L	0.2	280	
Chloroform	<0.5 ~0.2	ug/L	0.0	00	
	<0.2	ug/L	0.2		
Dichloromothono	<0.2	ug/L	0.2	50	
Ethylhonzona	<0.0	ug/L	0.0	140	
	<0.2	ug/L	0.2	140	
m+p-Xylene	<0.4	ug/L	0.4		
U-Xylene	<0.2	ug/L	0.2	10	
retrachloroethylene	<0.2	ug/L	0.2	10	

Result	Units	МОІ	ODWS (Amnd O.Reg.457/16) Jan2020 02
<0.2		0.2	60
<0.2	ug/∟ ⊔g/l	0.2	100
<0.4 <0.2	ug/L	0.4	5
<0.2	ug/L	0.2	1
<0.5	ug/L	0.5	90
<0.5	ug/L	0.5	
	Result           <0.2	Result         Units           <0.2	Result         Units         MDL           <0.2



Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-13
Date Submitted:	2022-12-14

Laboratory Work Order Number: 342390

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

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" † " indicates the analyte is not accredited to ISO/IEC 17025.

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				ODWS (Amnd O.Re	g.457/16) Jan2020
Analyte	Result	Units	MDL	02	2
Hamilton Water					
Monitoring Wells - Greensville GW - Pre-Pump Test					
Tews Falls 2022-12-13 15:40:00 Record 684378					
Alkalinity	183	ma/l	2		
Ammonia + Ammonium as N	0.18	ma/L	0.01		
Anion Sum (Calculation) †	25.9	me/L	0.1		
Bicarbonate as Carbonate (Calculation)	183	mg/L	2		
Bromide	1.1	mg/L	0.2		
Cation Sum (Calculation) †	25.2	me/L	0.1		
Chloride	171	mg/L	0.5		
Colour (apparent)	358	CU	2		
Conductivity	2110	umhos/cm	4		
Cyanide - Total	<0.003	mg/L	0.003	0.2	
Dissolved Organic Carbon	2.5	mg/L	0.4		
Fluoride	0.68	mg/L	0.04	1.5	
Ion Balance (Calculation) †	1.3	%	0.1		
Nitrate as N	2.86	mg/L	0.02	10.0	
Nitrate+Nitrite as N (Calculation)	2.86	mg/L	0.03		
Nitrite as N	<0.05	mg/L	0.05	1.0	
o-Phosphate as P	<0.05	mg/L	0.05		
рН	8.02	pН	0.01		
pH - Saturation (Calculation) †	6.91	pН	0.01		
Silica-Reactive	16.5	mg/L	0.20		
Sulphate	803	mg/L	0.5		
Temperature	21.7	С	0.1		
Total Suspended Solids	185	mg/L	0.8		
Turbidity	66.4	NTU	0.05		
Aluminum	0.308	mg/L	0.002		
Antimony	0.0004	mg/L	0.0001	0.006	
Arsenic	0.0006	mg/L	0.0001	0.010	
Barium	0.0537	mg/L	0.0001	1.0	
Beryllium	<0.0001	mg/L	0.0001		
Bismuth	<0.0001	mg/L	0.0001		
Boron	0.261	mg/L	0.010	5.0	
Cadmium	0.0002	mg/L	0.0001	0.005	
Calcium	268	mg/L	0.05		
Chromium	0.0005	mg/L	0.0001	0.05	
Cobalt	0.0005	mg/L	0.0001		
Copper	0.0022	mg/L	0.0001		
Hardness (Calculation)	1040	mg/L	0.3		
Iron	0.539	mg/L	0.003		
Lead	0.0122	mg/L	0.0001	0.010	*
Lithium	0.0534	mg/L	0.0005		
Magnesium	89.7	mg/L	0.05		
Manganese	0.0819	mg/L	0.0001		
Mercury	<0.05	ug/L	0.05	1	
Molybdenum	0.0483	mg/L	0.0001		
Nickel	0.0120	mg/L	0.0001		
Phosphorus Iotal	0.040	mg/L	0.010		
Potassium	21.4	mg/L	0.05	0.05	
Selenium	0.0004	mg/L	0.0001	0.05	
Silicon	J.47	mg/L	0.01		
Silver	<0.000T	mg/L	0.0001		

Sodium 81.9

mg/L

0.05

\*

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				ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Strontium	9.62	mg/L	0.0005	
Thallium	0.0004	mg/L	0.0003	
Tin	<0.0001	mg/L	0.0001	
Titanium	0.0068	mg/L	0.0004	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	10.5	ug/L	0.002	20
Vanadium	0.0011	mg/L	0.0001	
Zinc	0.267	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	
Escherichia coli	10	MPN/100mL	0	0 *
Total Coliform	1960	MPN/100mL	0	0 *
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90



Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-13
Date Submitted:	2022-12-14

Laboratory Work Order Number: 342391

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

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" † " indicates the analyte is not accredited to ISO/IEC 17025.

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		<b>_</b>			0DWS (Amnd O.Reg.457/16) Jan2020 مع
Hamilton Water	Analyte	Result	Units	MDL	VZ
Manitaring Walls					
Monitoring wens	- Greensville Gw - Pump Test				
TW-2-13 2022-12-13	16:15:00 Record 684379				
	Alkalinity	318	mg/L	2	
	Ammonia + Ammonium as N	<0.01	mg/L	0.01	
	Anion Sum (Calculation) †	10.7	me/L	0.1	
	Bicarbonate as Carbonate (Calculation)	318	mg/L	2	
	Bromide	<1	mg/L	1	
	Cation Sum (Calculation) †	10.5	me/L	0.1	
	Chloride	95.5	mg/L	0.5	
	Colour (apparent)	4	CU	2	
	Conductivity	970	umhos/cm	4	
	Cyanide - Total	<0.003	mg/L	0.003	0.2
	Dissolved Organic Carbon	0.9	mg/L	0.4	
	Fluoride	0.16	mg/L	0.04	1.5
	Ion Balance (Calculation) †	0.6	%	0.1	
	Nitrate as N	2.93	mg/L	0.02	10.0
	Nitrate+Nitrite as N (Calculation)	2.93	mg/L	0.03	
	Nitrite as N	<0.05	mg/L	0.05	1.0
	o-Phosphate as P	<0.05	mg/L	0.05	
	рН	7.86	pН	0.01	
	pH - Saturation (Calculation) †	6.86	pН	0.01	
	Silica-Reactive	<0.20	mg/L	0.20	
	Sulphate	66.5	mg/L	0.5	
	Temperature	20.4	Ċ	0.1	
	Total Suspended Solids	<3	mg/L	3	
	Turbidity	0.47	NTU	0.05	
	Aluminum	0.003	mg/L	0.002	
	Antimony	<0.0001	mg/L	0.0001	0.006
	Arsenic	0.0003	mg/L	0.0001	0.010
	Barium	0.104	mg/L	0.0001	1.0
	Beryllium	<0.0001	mg/L	0.0001	
	Bismuth	<0.0001	mg/L	0.0001	
	Boron	0.023	mg/L	0.010	5.0
	Cadmium	<0.0001	mg/L	0.0001	0.005
	Calcium	133	mg/L	0.05	
	Chromium	0.0002	mg/L	0.0001	0.05
	Cobalt	<0.0001	mg/L	0.0001	
	Copper	0.0005	mg/L	0.0001	
	Hardness (Calculation)	431	mg/L	0.3	
	Iron	0.065	mg/L	0.003	
	Lead	0.0001	mg/L	0.0001	0.010
	Lithium	0.0099	mg/L	0.0005	
	Magnesium	24.1	mg/L	0.05	
	Manganese	0.0062	mg/L	0.0001	
	Mercury	<0.05	ug/L	0.05	1
	Molybdenum	0.0004	mg/L	0.0001	
	Nickel	0.0005	mg/L	0.0001	
	Phosphorus Total	<0.010	mg/L	0.010	
	Potassium	1.71	mg/L	0.05	
	Selenium	0.0002	mg/L	0.0001	0.05
	Silicon	7.73	mg/L	0.01	
	Silver	<0.0001	mg/L	0.0001	
	Sodium	41.5	mg/L	0.05	20 *

				ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Strontium	1.61	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	<0.0001	mg/L	0.0001	
Titanium	0.0004	mg/L	0.0004	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	0.717	ug/L	0.002	20
Vanadium	<0.0001	mg/L	0.0001	
Zinc	0.036	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	0	MPN/100mL	0	0
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90



Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-14
Date Submitted:	2022-12-15

Laboratory Work Order Number: 342403

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

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" † " indicates the analyte is not accredited to ISO/IEC 17025.

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			C	DWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Hamilton Water				
Monitoring Wells - Greensville GW - Pump Test				
<b>-</b>				
TW-2-13 2022-12-14 16:00:00 Record 684422				
Alkalinity	320	ma/L	2	
Ammonia + Ammonium as N	<0.01	ma/L	0.01	
Anion Sum (Calculation) †	11.4	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	320	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	10.8	me/L	0.1	
Chloride	106	mg/L	0.5	
Colour (apparent)	3	CU	2	
Conductivity	1020	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	1.1	mg/L	0.4	
Fluoride	0.16	mg/L	0.04	1.5
Ion Balance (Calculation) †	2.6	%	0.1	
Nitrate as N	3.20	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	3.20	mg/L	0.03	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.87	pН	0.01	
pH - Saturation (Calculation) †	6.85	pН	0.01	
Silica-Reactive	15.9	mg/L	0.20	
Sulphate	66.5	mg/L	0.5	
Temperature	20.9	С	0.1	
Total Suspended Solids	<2	mg/L	2	
Turbidity	0.47	NTU	0.05	
Aluminum	<0.002	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0002	mg/L	0.0001	0.010
Barium	0.109	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.023	mg/L	0.010	5.0
Cadmium	<0.0001	mg/L	0.0001	0.005
Calcium	134	mg/L	0.05	
Chromium	0.0002	mg/L	0.0001	0.05
Cobalt	<0.0001	mg/L	0.0001	
Copper	0.0005	mg/L	0.0001	
Hardness (Calculation)	436	mg/L	0.3	
Iron	0.042	mg/L	0.003	
Lead	<0.0001	mg/L	0.0001	0.010
Lithium	0.0114	mg/L	0.0005	
Magnesium	24.6	mg/L	0.05	
Manganese	0.0056	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0004	mg/L	0.0001	
Nickel	0.0005	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	

Potassium

Selenium

Silicon

Silver

Sodium

1.81

0.0002

8.06

<0.0001

46.9

mg/L

mg/L

mg/L

mg/L

mg/L

0.05

0.0001

0.01

0.0001

0.05

\*

0.05

20

				ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Strontium	1.68	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	<0.0001	mg/L	0.0001	
Titanium	<0.0004	mg/L	0.0004	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	0.747	ug/L	0.002	20
Vanadium	<0.0001	mg/L	0.0001	
Zinc	0.035	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	0	MPN/100mL	0	0
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90



Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

 Sample Date:
 2022-12-15

 Date Submitted:
 2022-12-15

Laboratory Work Order Number: 342408

Samples in this work order were analyzed using the following methods:

Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC	Bacteria MPN
Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate	LIMS Calculation
Mercury Cold Vapour AA	Metals ICP/MS	TOC/DOC Colourimetric	Turbidity Turbimeter

Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

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	Analyte	Result	Units	MDL	ODWS (Amnd O.Reg.457/16) Jan2020 02
Hamilton Water					
Monitoring Wells - Greensville GW - Pump Test					

## WELL:FDG01(GREENSVILLE WELL SUPPLY) 2022-12-15 09:30:00 Record 684440

Alkalinity	373	mg/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Chloride	298	mg/L	0.5	
Colour (apparent)	<2	CU	2	
Conductivity	1730	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.7	mg/L	0.4	
Fluoride	0.11	mg/L	0.04	1.5
Nitrate as N	7.22	mg/L	0.02	10.0
Nitrite as N	<0.01	mg/L	0.01	1.0
Ha	7.67	Ha	0.01	
Sulphate	63.3	ma/L	0.5	
Total Organic Carbon	1.0	mg/L	0.4	
Turbidity	0.12	NTU	0.05	
Aluminum	< 0.002	ma/L	0.002	
Antimony	< 0.0001	mg/L	0.0001	0.006
Arsenic	< 0.0001	mg/L	0.0001	0.010
Barium	0 167	mg/l	0.0001	1.0
Bervllium	<0.0001	mg/l	0.0001	110
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.043	mg/L	0.0001	5.0
Cadmium	<0.010	mg/L	0.0001	0.005
Calcium	160	mg/L	0.0001	0.000
Chromium	0 0002	mg/L	0.001	0.05
Cobalt	<0.0002	mg/L	0.0001	0.00
Copper	0.0007	mg/L	0.0001	
Hardness (Calculation)	511	mg/L	0.0001	
Iron	~0.003	mg/L	0.0	
hon	<0.000	mg/L	0.000	0.010
Lithium		mg/L	0.0001	0.010
Magnesium	27.1	mg/L	0.0000	
Magnesium	~0.0001	mg/L	0.00	
Marcury	<0.0001	ing/∟	0.0001	1
Molybdenum	<0.05	ug/L	0.00	
Nickel	0.0002	mg/L	0.0001	
Phosphorus Total	~0.010	mg/L	0.0001	
Potassium	2.26	mg/L	0.010	
Selenium	0.0003	mg/L	0.00	0.05
Silicon	6.36	mg/L	0.0001	0.00
Silver	~0.001	mg/L	0.01	
Sodium	163	mg/L	0.0001	20
Strontium	1.00	mg/L	0.00	20
Thallium	~0.0003	mg/L	0.0003	
Tin	<0.0003	mg/L	0.0003	
Titanium	<0.0001	mg/L	0.0001	
Tungeton		ma/l	0.0004	
Uranium	0.708	nig/∟	0.0001	20
Vanadium		mg/L	0.002	20
Variaululli Zino		mg/L	0.0001	
Ziroonium		mg/L	0.001	
Ziiconulli Ecoboriatia aali	×0.0004 م	MDN/100ml	0.0004	0
	U	IVITIN/ IOUTIL	U	U

\*

Analyte	Result	Units	МП	ODWS (Amnd O.Reg.457/16) Jan2020 02
	Nesun			
l otal Coliform	0	MPN/100mL	0	0
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	0.4	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90



Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2 City of Hamilton Environmental Laboratory 700 Woodward Avenue, Hamilton, ON L8H 6P4 P. (905) 546-2424 F. (905)545-0234

#### LABORATORY INFORMATION

 Sample Date:
 2022-12-15

 Date Submitted:
 2022-12-15

Laboratory Work Order Number: 342410

Samples in this work order were analyzed using the following methods:

Microcystin ADDA

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

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		Analyte	Result	Units	MDL
Har	nilton Water				
	Monitoring Wells - Greensville GW - Pump Test				
	WELL:FDG01(GREENSVILLE WELL SUPPLY) 2022-12-1	15 09:30:00 R	lecord 684442		

Microcystins <0.15 ug/L 0.15



Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-15
Date Submitted:	2022-12-15

Laboratory Work Order Number: 342413

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

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			(	ODWS (Amnd O.Re	g.457/16) Jan2020
Analyte	Result	Units	MDL	02	!
Hamilton Water					
Monitoring Wells - Greensville GW - Post Pump Test					
Surface Water 2022-12-15 10:20:00 Record 684450					
Alkalinity	203	ma/l	2		
Ammonia + Ammonium as N	0.12	mg/L	0.01		
Anion Sum (Calculation) †	21.9	me/L	0.1		
Bicarbonate as Carbonate (Calculation)	203	mg/L	2		
Bromide	<1	mg/L	1		
Cation Sum (Calculation) †	25.2	me/L	0.1		
Chloride	167	mg/L	0.5		
Colour (apparent)	2850	CU	2		
Conductivity	1850	umhos/cm	4		
Cyanide - Total	<0.003	mg/L	0.003	0.2	
Dissolved Organic Carbon	3.6	mg/L	0.4		
Fluoride	0.57	mg/L	0.04	1.5	
Ion Balance (Calculation) †	7.1	%	0.1		
Nitrate as N	2.06	mg/L	0.02	10.0	
Nitrate+Nitrite as N (Calculation)	2.06	mg/L	0.03		
Nitrite as N	<0.05	mg/L	0.05	1.0	
o-Phosphate as P	<0.05	mg/L	0.05		
pH	7.94	pН	0.01		
pH - Saturation (Calculation) †	6.88	pН	0.01		
Silica-Reactive	4.39	mg/L	0.20		
Sulphate	614	mg/L	0.5		
Temperature	20.5	С	0.1		
Total Suspended Solids	1360	mg/L	0.8		
Turbidity	592	NTU	0.05		
Aluminum	4.14	mg/L	0.002		
Antimony	0.0004	mg/L	0.0001	0.006	
Arsenic	0.0030	mg/L	0.0001	0.010	
Barium	0.0764	mg/L	0.0001	1.0	
Beryllium	0.0002	mg/L	0.0001		
Bismuth	<0.0001	mg/L	0.0001		
Boron	0.194	mg/L	0.010	5.0	
Cadmium	0.0009	mg/L	0.0001	0.005	
Calcium	262	mg/L	0.05		
Chromium	0.0058	mg/L	0.0001	0.05	
Cobalt	0.0046	mg/L	0.0001		
Copper	0.0168	mg/L	0.0001		
Hardness (Calculation)	1010	mg/L	0.3		
Iron	7.28	mg/L	0.003		
Lead	0.0926	mg/L	0.0001	0.010	*
Lithium	0.0465	mg/L	0.0005		
Magnesium	86.3	mg/L	0.05		
Manganese	0.906	mg/L	0.0001		
Mercury	0.06	ug/L	0.05	1	
Molybdenum	0.0399	mg/L	0.0001		
Nickel	0.0258	mg/L	0.0001		
Phosphorus Iotal	0.372	mg/L	0.010		
Potassium	18.3	mg/L	0.05	0.05	
Selenium	0.0006	mg/L	0.0001	0.05	
Silicon	8.90	mg/∟	0.01		
Silver	<0.0001	mg/L	0.0001		

mg/L

Sodium 81.6

0.05

\*

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				ODWS (Amnd O.Reg.457/16) Jan20	
Analyte	Result	Units	MDL	02	
Strontium	7.43	mg/L	0.0005		
Thallium	0.0006	mg/L	0.0003		
Tin	0.0006	mg/L	0.0001		
Titanium	0.0789	mg/L	0.0004		
Tungsten	<0.0001	mg/L	0.0001		
Uranium	7.64	ug/L	0.002	20	
Vanadium	0.0102	mg/L	0.0001		
Zinc	0.902	mg/L	0.001		
Zirconium	0.0010	mg/L	0.0004		
Escherichia coli	20	MPN/100mL	0	0 *	
Total Coliform	3650	MPN/100mL	0	0 *	
1,1-Dichloroethylene	<0.2	ug/L	0.2	14	
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200	
1,2-Dichloroethane	<0.2	ug/L	0.2	5	
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5	
Benzene	<0.2	ug/L	0.2	1	
Bromodichloromethane	<0.2	ug/L	0.2		
Bromoform	<0.2	ug/L	0.2		
Carbon Tetrachloride	<0.2	ug/L	0.2	2	
Chlorobenzene	<0.3	ug/L	0.3	80	
Chloroform	<0.2	ug/L	0.2		
Dibromochloromethane	<0.2	ug/L	0.2		
Dichloromethane	<0.5	ug/L	0.5	50	
Ethylbenzene	<0.2	ug/L	0.2	140	
m+p-Xylene	<0.4	ug/L	0.4		
o-Xylene	<0.2	ug/L	0.2		
Tetrachloroethylene	<0.2	ug/L	0.2	10	
Toluene	<0.2	ug/L	0.2	60	
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100	
Trichloroethylene	<0.2	ug/L	0.2	5	
Vinyl Chloride	<0.2	ug/L	0.2	1	
Xylene (Calculation)	<0.5	ug/L	0.5	90	



Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-15
Date Submitted:	2022-12-16

Laboratory Work Order Number: 342426

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

Analyte	Result	Units	MDL	ODWS (Amnd O.Reg.457/16) Jan2020 02
Hamilton Water				
Monitoring Wells - Greensville GW - Post Pump Test				
3 Medwin Dr 2022-12-15 15:45:00 Record 684471				
Alkalinity	289	ma/L	2	
Ammonia + Ammonium as N	<0.01	ma/L	0.01	
Anion Sum (Calculation) †	10.0	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	289	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	9.7	me/L	0.1	
Chloride	80.6	mg/L	0.5	
Colour (apparent)	18	CU	2	
Conductivity	886	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.7	mg/L	0.4	
Fluoride	0.27	mg/L	0.04	1.5
Ion Balance (Calculation) †	1.3	%	0.1	
Nitrate as N	1.61	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.61	mg/L	0.03	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.79	pН	0.01	
pH - Saturation (Calculation) †	6.95	pН	0.01	
Silica-Reactive	12.7	mg/L	0.20	
Sulphate	70.6	mg/L	0.5	
Temperature	20.3	С	0.1	
Total Suspended Solids	<5	mg/L	5	
Turbidity	4.12	NTU	0.05	
Aluminum	0.006	mg/L	0.002	
Antimony	0.0002	mg/L	0.0001	0.006
Arsenic	0.0004	mg/L	0.0001	0.010
Barium	0.0610	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.029	mg/L	0.010	5.0
Cadmium	<0.0001	mg/L	0.0001	0.005
Calcium	118	mg/L	0.05	
Chromium	0.0002	mg/L	0.0001	0.05
Cobalt	<0.0001	mg/L	0.0001	
Copper	0.0034	mg/L	0.0001	
Hardness (Calculation)	397	mg/L	0.3	
Iron	1.21	mg/L	0.003	
Lead	0.0024	mg/L	0.0001	0.010
Lithium	0.0117	mg/L	0.0005	5
Magnesium	24.9	mg/L	0.05	
Manganese	0.0239	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0012	mg/L	0.0001	
Nickel	0.0016	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	2.08	mg/L	0.05	
Selenium	0.0003	mg/L	0.0001	0.05

Silicon

Silver

Sodium

6.38

< 0.0001

37.9

mg/L

mg/L

mg/L

0.01

0.0001

0.05

\*

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Analyte	Result	(Inite	О 10	DWS (Amnd O.Reg.457/16) Jan2020 02
Alialyte	1 /0	ma/l	0.0005	
Strontium	1.48	mg/L	0.0005	
Thamum	<0.0003	mg/L	0.0003	
Titonium	0.0005	mg/L	0.0001	
	0.0006	mg/L	0.0004	
l ungsten	<0.0001	mg/∟	0.0001	20
Uranium	1.42	ug/L	0.002	20
vanadium Zia -	<0.0001	mg/L	0.0001	
ZINC Zinc zitere	0.043	mg/L	0.001	
	<0.0004	mg/L	0.0004	2
	0	MPN/100mL	0	0
I otal Coliform	461	MPN/100mL	0	0 *
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ua/L	0.4	100
Trichloroethvlene	<0.2	ua/L	0.2	5
Vinvl Chloride	<0.2	ua/L	0.2	1
Xvlene (Calculation)	< 0.5	ug/L	0.5	90
Medwin Dr 2022-12-15 16:15:00 Pecord 694472		- Ur -		
5 meawill DI 2022-12-15 10:15:00 Record 6844/2				
Alkalinity	306	mg/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	12.1	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	306	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	11.8	me/L	0.1	
Chloride	113	mg/L	0.5	
Colour (apparent)	13	cŬ	2	
Conductivity	1080	umhos/cm	4	
Cvanide - Total	< 0.003	ma/L	0.003	0.2
Dissolved Organic Carbon	0.8	ma/l	0.4	
Fluorida	0.58	ma/l	0.04	1.5
Ion Ralance (Calculation) +	1 3	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0.0-	1.0
Nitrate as N	1 31	ma/l	0.1	10.0
Nitrate+Nitrite as N (Calculation)	1.31	mg/L	0.02	10.0
Nitrate TNILLIE as N (Calculation)	-0 05	mg/L	0.03	1.0
Nume as N		mg/L	0.00	1.0
	<0.00 7 56	ப்பு/ட	0.05	
PH bl. Soturation (Coloritation) +	00.1	рп	0.01	
$p_{H}$ - Saturation (Calculation) †	0.00	рп	0.01	
Silica-Reactive	13.4	mg/L	0.20	
	110	mg/L	0.5	
Iemperature	20.7	C	0.1	

Analyte	Result	Units	MDL	02 02 (Annu O.Keg.45//16) 02
Total Suspended Solids	4.0	mg/L	0.8	
Turbidity	2.28	NŤU	0.05	
Aluminum	0.010	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0002	mg/L	0.0001	0.010
Barium	0.0707	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.064	mg/L	0.010	5.0
Cadmium	0.0001	mg/L	0.0001	0.005
Calcium	143	mg/L	0.05	
Chromium	0.0007	mg/L	0.0001	0.05
Cobalt	0.0004	mg/L	0.0001	
Copper	0.0789	mg/L	0.0001	
Hardness (Calculation)	495	mg/L	0.3	
Iron	0.358	mg/L	0.003	
Lead	0.0018	mg/L	0.0001	0.010
Lithium	0.0156	mg/L	0.0005	
Magnesium	33.6	mg/L	0.05	
Manganese	0.0654	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0012	mg/L	0.0001	
Nickel	0.0075	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	2.70	mg/L	0.05	
Selenium	<0.0001	mg/L	0.0001	0.05
Silicon	6.59	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	
Sodium	37.7	mg/L	0.05	20 *
Strontium	5.17	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	0.0012	mg/L	0.0001	
Titanium	0.0007	mg/L	0.0004	
Tungsten	0.0002	mg/L	0.0001	
Uranium	2.39	ug/L	0.002	20
Vanadium	0.0001	mg/L	0.0001	
Zinc	0.171	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	16	MPN/100mL	0	0 *
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60

			C	DWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
609 Harvest Rd 2022-12-15 16:00:00 Record 684473				
Alkalinity	302	ma/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	10.1	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	302	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	10.0	me/L	0.1	
Chloride	66.2	mg/L	0.5	
Colour (apparent)	32	ČŬ	2	
Conductivity	886	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.7	mg/L	0.4	
Fluoride	0.48	mg/L	0.04	1.5
Ion Balance (Calculation) †	0.5	%	0.1	
Nitrate as N	1.28	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.28	mg/L	0.03	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.72	рН	0.01	
pH - Saturation (Calculation) †	6.91	рН	0.01	
Silica-Reactive	13.2	mg/L	0.20	
Sulphate	81.7	mg/L	0.5	
Temperature	20.6	č	0.1	
Total Suspended Solids	19.0	mg/L	0.8	
Turbidity	6.64	NTU	0.05	
Aluminum	0.190	mg/L	0.002	
Antimony	0.0002	mg/L	0.0001	0.006
Arsenic	0.0010	mg/L	0.0001	0.010
Barium	0.0707	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.035	mg/L	0.010	5.0
Cadmium	0.0001	mg/L	0.0001	0.005
Calcium	122	mg/L	0.05	
Chromium	0.0008	mg/L	0.0001	0.05
Cobalt	0.0031	mg/L	0.0001	
Copper	0.0089	mg/L	0.0001	
Hardness (Calculation)	420	mg/L	0.3	
Iron	2.65	mg/L	0.003	
Lead	0.0064	mg/L	0.0001	0.010
Lithium	0.0127	mg/L	0.0005	
Magnesium	28.0	mg/L	0.05	
Manganese	0.191	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0014	mg/L	0.0001	
Nickel	0.0068	mg/L	0.0001	
Phosphorus Total	0.022	mg/L	0.010	
Potassium	2.27	mg/L	0.05	
Selenium	0.0003	mg/L	0.0001	0.05
Silicon	6.99	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	

Analuta	Result	Unite	01 יחא	02020 OWS (Amnd O.Reg.457/16) Jan2020
Allaiyte	Result	Units		
Sodium	29.8	mg/L	0.05	20 *
Strontium	3.62	mg/L	0.0005	
Tiallium	<0.0003	mg/L	0.0003	
Titanium	0.0004	mg/L	0.0001	
Tungsten	0.0004 ∠0.0001	mg/L	0.0004	
l Iranium	1 96	ing/∟	0.0001	20
Vanadium	0 0000	mg/L	0.002	20
Zinc	0.0003	mg/L	0.0001	
Zirconium	<0.104	mg/L	0.001	
Escherichia coli	×0.000 0	MPN/100ml	0.0004	0
Total Coliform	866	MPN/100mL	0	0 *
1 1-Dichloroethylene	<0.2		0.2	14
1,7 Dichlorobenzene	<0.2	ug/L	0.2	200
1.2-Dichloroethane	<0.2	ug/L	0.2	5
1,2 Dichlorobenzene	<0.2	ug/L	0.2	5
Renzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	·
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.2	ug/L	0.2	80
Chloroform	<0.0	ug/L	0.0	00
Dibromochloromethane	<0.2	ug/L	0.2	
Distonochioromethane	<0.2	ug/L	0.2	50
Ethylbenzene	<0.3	ug/L	0.3	140
	<0.2	ug/L	0.2	140
o-Xvlene	<0.7	ug/L	0.4	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Tribalomethanes (Calculation)	<0.2	ug/L	0.2	100
	<0.4	ug/L	0.4	5
Vinvl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
	1010	49, L	0.0	
63 Tews Ln 2022-12-15 15:30:00 Record 684475				
Alkalinity	274	mg/L	2	
Ammonia + Ammonium as N	0.04	mg/L	0.01	
Anion Sum (Calculation) †	9.2	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	274	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	9.1	me/L	0.1	
Chloride	40.5	mg/L	0.5	
Colour (apparent)	67	CU	2	
Conductivity	780	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.6	mg/L	0.4	
Fluoride	0.31	mg/L	0.04	1.5
Ion Balance (Calculation) †	0.6	%	0.1	
Nitrate as N	<0.1	mg/L	0.1	10.0
Nitrate+Nitrite as N (Calculation)	<0.2	mg/L	0.2	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.49	pН	0.01	
pH - Saturation (Calculation) †	6.98	pН	0.01	
Silica-Reactive	21.2	mg/L	0.20	
Sulphate	97.0	mg/L	0.5	

Analyte	Result	Units	MDL	02	2
	Nesuit	onits			
	20.3	C	0.1		
Total Suspended Solids	9.7	mg/L	0.8		
I urbidity	11.2	NIU	0.05		
Aluminum	0.109	mg/L	0.002		
Antimony	<0.0001	mg/L	0.0001	0.006	<b>.</b>
Arsenic	0.0146	mg/L	0.0001	0.010	×
Barium	0.0568	mg/L	0.0001	1.0	
Beryllium	<0.0001	mg/L	0.0001		
Bismuth	<0.0001	mg/L	0.0001		
Boron	0.027	mg/L	0.010	5.0	
Cadmium	<0.0001	mg/L	0.0001	0.005	
Calcium	113	mg/L	0.05		
Chromium	0.0002	mg/L	0.0001	0.05	
Cobalt	0.0002	mg/L	0.0001		
Copper	0.0007	mg/L	0.0001		
Hardness (Calculation)	399	mg/L	0.3		
Iron	6.91	mg/L	0.003		
Lead	0.0012	mg/L	0.0001	0.010	
Lithium	0.0120	mg/L	0.0005		
Magnesium	28.4	mg/L	0.05		
Manganese	0.0586	mg/L	0.0001		
Mercury	<0.05	ug/L	0.05	1	
Molybdenum	0.0011	mg/L	0.0001		
Nickel	0.0006	mg/L	0.0001		
Phosphorus Total	0.051	mg/L	0.010		
Potassium	1.28	mg/L	0.05		
Selenium	<0.0001	mg/L	0.0001	0.05	
Silicon	11.9	mg/L	0.01		
Silver	<0.0001	mg/L	0.0001		
Sodium	15.6	mg/L	0.05	20	
Strontium	6.37	mg/L	0.0005		
Thallium	<0.0003	mg/L	0.0003		
Tin	0.0004	ma/L	0.0001		
Titanium	0.0046	ma/L	0.0004		
Tunasten	<0.0001	ma/L	0.0001		
Uranium	0.167	ua/L	0.002	20	
Vanadium	0.0003	ma/L	0.0001		
Zinc	0.012	ma/L	0.001		
Zirconium	<0.0004	mg/L	0.0004		
Escherichia coli	0	MPN/100ml	0.0001	0	
Total Coliform	10	MPN/100ml	0	0	*
1 1-Dichloroethylene	<0.2		0.2	14	
1 2-Dichlorobenzene	<0.2	ug/L	0.2	200	
1.2-Dichloroethane	<0.2	ug/L	0.2	5	
1 4-Dichlorobenzene	<0.2	ug/L	0.2	5	
Renzono	<0.2	ug/L	0.2	1	
Benzediableremethene	<0.2	ug/L	0.2	I	
	<0.2	ug/L	0.2		
Bromotorm	<0.2	ug/L	0.2	0	
	<0.2	ug/L	0.2	2	
Chlorobenzene	<0.3	ug/L	0.3	80	
Chloroform	<0.2	ug/L	0.2		
Dibromochloromethane	<0.2	ug/L	0.2		
Dichloromethane	<0.5	ug/L	0.5	50	
Ethylbenzene	<0.2	ug/L	0.2	140	
m+p-Xylene	<0.4	ug/L	0.4		
o-Xylene	<0.2	ug/L	0.2		
Tetrachloroethylene	<0.2	ug/L	0.2	10	

• • • ·	<b>.</b>			ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
Travel Blank 2022-12-15 Record 684474				
Dissolved Organic Carbon	<0.4	mg/L	0.4	
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90



Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-15
Date Submitted:	2022-12-16

Laboratory Work Order Number: 342427

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

Analyte	Result	Units		WS (Amnd O.R (	eg.457/16) Jan2020 )2
milton Water					
Monitoring Wells - Greensville GW - Post Pump Test					
TW-1-13 2022-12-15 17:20:00 Record 684476					
Alkalinity	275	mg/L	2		
Ammonia + Ammonium as N	0.02	mg/L	0.01		
Anion Sum (Calculation) †	8.5	me/L	0.1		
Bicarbonate as Carbonate (Calculation)	275	mg/L	2		
Bromide	<1	mg/L	1		
Cation Sum (Calculation) †	161	me/L	0.1		
Chloride	10.6	mg/L	0.5		
Colour (apparent)	162000	CU	2		
Conductivity	650	umhos/cm	4		
Cyanide - Total	<0.003	mg/L	0.003	0.2	
Dissolved Organic Carbon	7.4	mg/L	0.4		
Fluoride	0.27	mg/L	0.04	1.5	
Ion Balance (Calculation) †	90.0	%	0.1	40.0	
Nitrate as N	<0.1	mg/L	0.1	10.0	
	<0.2	mg/L	0.2	1.0	
Nitrite as N	<0.05	mg/L	0.05	1.0	
0-Phosphale as P	< 0.05	mg/∟	0.05		
p⊓ PH Saturation (Calculation) +	6.26	рн ъЧ	0.01		
piri - Saturation (Calculation)   Silica-Reactive	15.0	pri ma/l	0.01		
Sulphate	75.3	mg/L	0.20		
Temperature	20.5	nig/L	0.5		
Total Suspended Solids	10600	ma/l	0.1		
Turbidity	12800	NTU	0.05		
Aluminum	55.2	ma/l	0.00		
Antimony	0.0040	mg/L	0.0005	0.006	
Arsenic	2.97	ma/L	0.0005	0.010	*
Barium	4.11	ma/L	0.0005	1.0	*
Bervllium	0.0042	ma/L	0.0005		
Bismuth	0.0009	ma/L	0.0005		
Boron	0.092	ma/L	0.050	5.0	
Cadmium	0.0048	mg/L	0.0005	0.005	
Calcium	711	mg/L	0.2		
Chromium	0.0811	mg/L	0.0005	0.05	*
Cobalt	0.106	mg/L	0.0005		
Copper	0.267	mg/L	0.0005		
Hardness (Calculation)	2370	mg/L	1		
Iron	2940	mg/L	0.2		
Lead	2.84	mg/L	0.0005	0.010	*
Lithium	0.103	mg/L	0.002		
Magnesium	145	mg/L	0.2		
Manganese	11.4	mg/L	0.0005		
Mercury	<0.05	ug/L	0.05	1	
Molybdenum	0.0115	mg/L	0.0005		
Nickel	0.113	mg/L	0.0005		
Phosphorus Total	22.2	mg/L	0.050		
Potassium	13.4	mg/L	0.2		
Selenium	0.0008	mg/L	0.0005	0.05	
Silicon	349	mg/L	0.05		
Silver	<0.0005	mg/L	0.0005		
Sodium	10.9	mg/L	0.2	20	

mg/L

Analista	Pageilt	Unite		02020 OWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	~
Strontium	22.8	mg/L	0.002	
Thallium	<0.002	mg/L	0.002	
Tin	0.0012	mg/L	0.0005	
Titanium	0.808	mg/L	0.002	
Tungsten	0.0038	mg/L	0.0005	
Uranium	3.13	ug/L	0.01	20
Vanadium	0.134	mg/L	0.0005	
Zinc	6.65	mg/L	0.005	
Zirconium	0.045	mg/L	0.002	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	236	MPN/100mL	0	0 *
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1.2-Dichlorobenzene	<0.2	ug/L	0.2	200
1.2-Dichloroethane	< 0.2	ug/L	0.2	5
1 4-Dichlorohenzene	<0.2	ua/l	0.2	5
Ronzono	<u></u> በ	ug/L	0.2	1
Bromodichloromethana	0.0 ~0.0	ug/L	0.2	·
Dromodiciiioioinellialle	<0.2	ug/L	0.2	
	<0.2	ug/L	0.2	3
	<0.2	ug/∟	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	0.3	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	1.0	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethvlene	<0.2	ua/L	0.2	5
Vinvl Chloride	<0.2	ua/L	0.2	1
Xvlene (Calculation)	<0.5	ug/l	0.5	90
ote: ICP-Metals, MDLs elevated due to matrix.		49, E	0.0	
W-3-13 2022-12-15 17:40:00 Record 684477				
Alkalinity	260	ma/l	2	
Ammonia + Ammonium as N	<0.01	ma/l	0.01	
Anion Sum (Calculation) +	76	me/l	0.01	
Bicarbonate as Carbonato. (Calculation)	0.1	ma/L	0.1 O	
	200	mg/L	۲ ۲	
	<1 7 5	mg/L	T O 4	
Cation Sum (Calculation) †	7.5	me/L	0.1	
Chloride	13.5	mg/L	0.5	
Colour (apparent)	404	CU	2	
Conductivity	633	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	<0.4	mg/L	0.4	
Fluoride	0.21	mg/L	0.04	1.5
Ion Balance (Calculation) †	0.4	%	0.1	
Nitrate as N	<0.1	ma/L	0.1	10.0
Nitrate+Nitrite as N (Calculation)	<0.2	ma/L	0.2	
Nitrite as N	<0.05	ma/l	0.05	1.0
o_Dhoenhate op D	<0.00 <0.05	mg/L	0.05	
U-FIIUSPIIALE AS P	×0.00 7 00	nng/∟ ∽⊔	0.00	
	7.02	рп	0.01	
$p_{H}$ - Saturation (Calculation) †	1.06	рн	0.01	
Silica-Reactive	15.3	mg/L	0.20	
Sulphate	75.1	mg/L	0.5	
Temperature	20.6	С	0.1	
Analyte	Result	Units	MDL	02
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Total Suspended Solids	74.5	ma/l	0.8	
Turbidity	54.8	NTU	0.05	
Aluminum	0.996	ma/L	0.002	
Antimony	0.0002	mg/L	0.0001	0.006
Arsenic	0.0049	mg/L	0.0001	0.010
Barium	0.0531	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.014	mg/L	0.010	5.0
Cadmium	0.0002	mg/L	0.0001	0.005
Calcium	95.0	mg/L	0.05	
Chromium	0.0014	mg/L	0.0001	0.05
Cobalt	0.0007	mg/L	0.0001	
Copper	0.0038	mg/L	0.0001	
Hardness (Calculation)	339	mg/L	0.3	
Iron	6.05	mg/L	0.003	
Lead	0.0164	mg/L	0.0001	0.010 *
Lithium	0.0109	mg/L	0.0005	
Magnesium	24.6	mg/L	0.05	
Manganese	0.0685	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0007	mg/L	0.0001	
Nickel	0.0020	mg/L	0.0001	
Phosphorus Total	0.063	mg/L	0.010	
Potassium	1.45	mg/L	0.05	
Selenium	0.0001	mg/L	0.0001	0.05
Silicon	9.99	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	
Sodium	7.94	mg/L	0.05	20
Strontium	0.445	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	<0.0001	mg/L	0.0001	
Titanium	0.0294	mg/L	0.0004	
Tungsten	0.0002	mg/L	0.0001	
Uranium	0.935	ug/L	0.002	20
Vanadium	0.0026	mg/L	0.0001	
Zinc	0.146	mg/L	0.001	
Zirconium	0.0011	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	0	MPN/100mL	0	0
1.1-Dichloroethylene	<0.2	ua/L	0.2	14
1.2-Dichlorobenzene	<0.2	ua/L	0.2	200
1.2-Dichloroethane	<0.2	ua/L	0.2	5
1.4-Dichlorobenzene	< 0.2	ua/L	0.2	5
Benzene	<0.2	ua/L	0.2	1
Bromodichloromethane	< 0.2	ua/L	0.2	
Bromoform	< 0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ua/L	0.2	2
Chlorobenzene	<0.3	ua/L	0.3	- 80
Chloroform	<0.2	ua/L	0.2	
Dibromochloromethane	<0.2	ua/l	0.2	
Dichloromethane	<0.5	ua/l	0.5	50
Ethvlhenzene	<0.2	ua/l	0.0	140
	<0.2	ua/l	0.4	
		ug/ L	0.7	
n+p-∧yiene ∩-Xvlene	<0.2	ua/l	02	
o-Xylene Tetrachloroethylene	<0.2 <0.2	ug/L ug/l	0.2 0.2	10

Analyte	Result	Units	MDI	DDWS (Amnd O.Reg.457/16) Jan2020 02
Total Tribalomethanes (Calculation)	<0.4	ug/l	0.4	100
	<0.4	ug/L	0.4	5
Viewl Chlorido	<0.2	ug/∟	0.2	1
Virigi Chloride Xvlone (Calculation)	<0.2	ug/∟	0.2	1
Aylene (Calculation)	<0.5	ug/L	0.5	90
MW-101 2022-12-15 17:00:00 Record 684478				
Alkalinity	274	mg/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	6.6	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	274	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	7.0	me/L	0.1	
Chloride	3.6	mg/L	0.5	
Colour (apparent)	616	CU	2	
Conductivity	557	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	<0.4	mg/L	0.4	
Fluoride	0.11	ma/L	0.04	1.5
Ion Balance (Calculation) †	3.2	%	0.1	-
Nitrate as N	1.08	ma/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.08	ma/L	0.03	
Nitrite as N	<0.05	ma/L	0.05	1.0
o-Phosphate as P	<0.05	ma/l	0.05	
Ha	7 84	nH	0.01	
pH - Saturation (Calculation) †	7.02	рН	0.01	
Silica-Reactive	13.8	ma/l	0.01	
Sulphate	26.2	mg/L	0.5	
Temperature	21.0		0.0	
Total Suspended Solids	169	ma/l	0.1	
Turbidity	87.3	NTU	0.05	
Aluminum	3 74	ma/l	0.00	
Antimony	0.0003	mg/L	0.002	0.006
Arsenic	0.0000	mg/L	0.0001	0.000
Barium	0.0022	mg/L	0.0001	1.0
Bandin	0.100	mg/L	0.0001	1.6
Beryllum	<0.0002	mg/L	0.0001	
Bislindin	<0.0001	mg/∟	0.0001	5.0
Bololi	-0.013	mg/∟	0.010	0.005
Cauliium	<0.0001	mg/L	0.0001	0.005
Calcium	93.0	mg/L	0.00	0.05
Cholit	0.0000	mg/L	0.0001	0.05
Coppar	0.0030	mg/L	0.0001	
	0.0065	mg/L	0.0001	
Hardness (Calculation)	306	mg/L	0.3	
	5.61	mg/L	0.003	0.010
Lead	0.0034	mg/∟	0.0001	0.010
	0.0102	mg/L	0.0005	
Magnesium	17.5	mg/∟	0.05	
Manganese	0.213	mg/L	0.0001	,
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0003	mg/L	0.0001	
Nickel	0.0051	mg/L	0.0001	
Phosphorus Total	0.161	mg/L	0.010	
Potassium	2.09	mg/L	0.05	
Selenium	0.0004	mg/L	0.0001	0.05
Silicon	13.2	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	

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				ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Sodium	4.67	mg/L	0.05	20
Strontium	0.258	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	0.0002	mg/L	0.0001	
Titanium	0.103	mg/L	0.0004	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	0.368	ug/L	0.002	20
Vanadium	0.0071	mg/L	0.0001	
Zinc	0.026	mg/L	0.001	
Zirconium	0.0010	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	1	MPN/100mL	0	0 *
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	0.2	ug/L	0.2	140
m+p-Xylene	1.0	ug/L	0.4	
o-Xylene	0.6	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	1.0	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	1.6	ug/L	0.5	90

Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



# Certificate of Analysis

### **CLIENT INFORMATION**

Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-15
Date Submitted:	2022-12-16

Laboratory Work Order Number: 342428

Samples in this work order were analyzed using the following methods:

Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC	Bacteria MPN
Caffeine SPE GC/MS	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Subcontract
TOC/DOC Colourimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS	

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

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				ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Hamilton Water				
Monitoring Wells - Greensville GW - Pump Test				
TW-2-13 2022-12-15 16:36:00 Record 684479				
Alkalinity	311	ma/l	2	
Ammonia + Ammonium as N	<0.01	ma/L	0.01	
Chloride	107	mg/L	0.5	
Colour (apparent)	3	cŬ	2	
Conductivity	1020	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.6	mg/L	0.4	
Fluoride	0.16	mg/L	0.04	1.5
Nitrate as N	3.21	mg/L	0.02	10.0
Nitrite as N	<0.05	mg/L	0.05	1.0
pH	7.80	рН	0.01	
Sulphate	66.3	mg/L	0.5	
Total Organic Carbon	0.8	mg/L	0.4	
Turbidity	0.36	NTU	0.05	
Aluminum	<0.002	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0002	mg/L	0.0001	0.010
Barium	0.110	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	5.0
BUIUII	0.020	mg/L	0.010	5.0
Cadrium	133	mg/L	0.0001	0.005
Chromium	0.0002	mg/L	0.00	0.05
Cobalt	<0.0002	mg/L	0.0001	0.03
Copper	0.0006	mg/L	0.0001	
Hardness (Calculation)	433	mg/L	0.0001	
Iron	0.042	ma/L	0.003	
Lead	< 0.0001	ma/L	0.0001	0.010
Lithium	0.0108	mg/L	0.0005	
Magnesium	24.6	mg/L	0.05	
Manganese	0.0053	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0004	mg/L	0.0001	
Nickel	0.0005	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	1.79	mg/L	0.05	
Selenium	0.0002	mg/L	0.0001	0.05
Silicon	7.98	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	
Sodium	48.0	mg/L	0.05	20 *
Strontium	1.70	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	<0.0001	mg/L	0.0001	
Titanium	0.0004	mg/L	0.0004	
Tungsten	< 0.0001	mg/L	0.0001	22
Uranium	0.754	ug/L	0.002	20
Vanadium 	<0.0001	mg/L	0.0001	
	0.032	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	

Escherichia coli

MPN/100mL

0

0

0

Analyta	Result	Unite	C MDI	02020 (Amnd O.Reg.457/16) Jan2020
	C	MDN/400ml		
I otal Collform	U ~0 0		0	U 1/
1,1-Dichlorobenzene	<0.2	ug/L	0.2	200
1 2-Dichloroethane	<0.2	ug/L	0.2	5
1,2 Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ua/L	0.2	1
Bromodichloromethane	<0.2	ua/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
2,3,4,6-Tetrachlorophenol (Subcontract)	<1	ug/L	1	100
2,4,6-Trichlorophenol (Subcontract)	<0.2	ug/L	0.2	5
2,4-D (Subcontract)	<0.19	ug/L	0.19	100
2,4-Dichlorophenol (Subcontract)	<0.15	ug/L	0.15	900
Alachlor (Subcontract)	<0.02	ug/L	0.02	5
Atrazine (Subcontract)	<0.01	ug/L	0.01	
Atrazine + Desethyl-atrazine (Subcontract)	<0.01	ug/L	0.01	5
Azinphos-methyl (Subcontract)	<0.05	ug/L	0.05	20
Benzo[a]pyrene (Subcontract)	<0.01	ug/L	0.01	0.01
Bromate (Subcontract)	<0.005	mg/L	0.005	10
Bromoxynil (Subcontract)	<0.33	ug/L	0.33	5
Carbaryl (Subcontract)	< 0.05	ug/L	0.05	90
Carbofuran (Subcontract)	<0.01	ug/L	0.01	90
Chlorate (Subcontract)	0.02	mg/L	0.01	1.0
Chlorite (Subcontract)	<0.01	mg/L	0.01	1.0
Chiorpyritos (Dursban) (Subcontract)	<0.02	ug/L	0.02	90
Desethyl-atrazine (Subcontract)	<0.01	ug/L	0.01	20
Diazinon (Subcontract)	<0.02	ug/L	0.02	20
Dicamba (Subcontract)	<0.20	ug/L	0.20	120
Diciolop-Inelinyi (Subcontract)	<0.40	ug/L	0.40	9
Dimetrioate (Subcontract)	<0.00	ug/L	0.00	20
Diquar (Subcontract)	<0.002	ing/∟	0.001	150
Glyphosate (Subcontract)	<0.03	mg/L	0.03	280
Gross Alpha (Subcontract)	<0.001	Ra/I	0.001	200
Gross Beta (Subcontract)	<0.12	Bq/L	0.12	
Haloacetic Acids (Subcontract)	<5.3	ug/L	5.3	80
Malathion (Subcontract)	<0.02	ug/L	0.02	190
MCPA (Subcontract)	<0.12	ua/L	0.12	0.1
Metolachlor (Subcontract)	<0.01	ua/L	0.01	50
Metribuzin (Sencor) (Subcontract)	< 0.02	ug/L	0.02	80
NDMA (Subcontract)	< 0.0004	ma/l	0.0004	0.009
Nitrilotriacetic Acid (Subcontract)	< 0.03	ma/L	0.03	400
Paraguat (Subcontract)	< 0.002	ma/L	0.001	10
PCBsTotal (Subcontract)	< 0.04	ug/L	0.04	3.0
		-		

Analyte	Result	Units	MDL	ODWS (Amnd O.Reg.457/16) Jan2020 02
Pentachlorophenol (Subcontract)	<0.15	ug/L	0.15	60
Phorate (Subcontract)	<0.01	ug/L	0.01	2
Picloram (Subcontract)	<1	ug/L	1	190
Prometryne (Subcontract)	<0.03	ug/L	0.03	1
Simazine (Subcontract)	<0.01	ug/L	0.01	10
Terbufos (Subcontract)	<0.01	ug/L	0.01	1
Total Toxic Equivalency (Subcontract)	4.72	pg/L	4.72	
Triallate (Subcontract)	<0.01	ug/L	0.01	230
Trifluralin (Subcontract)	<0.02	ug/L	0.02	45
Tritium (Subcontract)	<15	Bq/L	15	
Caffeine	<0.5	ug/L	0.5	

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Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



CLIENT INFORMATION

Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2 City of Hamilton Environmental Laboratory 700 Woodward Avenue, Hamilton, ON L8H 6P4 P. (905) 546-2424 F. (905)545-0234

### LABORATORY INFORMATION

 Sample Date:
 2022-12-15

 Date Submitted:
 2022-12-16

Laboratory Work Order Number: 342429

Samples in this work order were analyzed using the following methods:

Microcystin ADDA

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

	Analyte	Result	Units	MDL	
Hamilton Water					
Monitoring Wells - Greensville GW - Pump T	est				
TW-2-13 2022-12-15 16:36:00 Record 684480					
	Microcystins	<0.15	ug/L	0.15	



# Certificate of Analysis

### **CLIENT INFORMATION**

Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date: 2023-01-10 Date Submitted: 2023-01-10

Laboratory Work Order Number: 342635

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

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			c	DWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Hamilton Water				
Monitoring Wells - Greensville GW - Additional Sam				
TW-3-13 2023-01-10 12:25:00 Record 686533				
Alkalinity	262	ma/l	2	
Ammonia + Ammonium as N	<0.01	ma/L	0.01	
Anion Sum (Calculation) †	7.5	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	262	mg/L	2	
Bromide	<0.2	mg/L	0.2	
Cation Sum (Calculation) †	7.3	me/L	0.1	
Chloride	12.9	mg/L	0.5	
Colour (apparent)	40	CU	2	
Conductivity	645	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	<0.4	mg/L	0.4	
Fluoride	0.26	mg/L	0.04	1.5
Ion Balance (Calculation) †	1.7	%	0.1	
Nitrate as N	<0.02	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	<0.03	mg/L	0.03	
Nitrite as N	<0.01	mg/L	0.01	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
pH	7.86	рН	0.01	
pH - Saturation (Calculation) †	7.03	рН	0.01	
Silica-Reactive	15.6	mg/L	0.20	
Sulphate	72.6	mg/L	0.5	
	21.2		0.1	
Total Suspended Solids	10.0	mg/∟ NTU	0.0	
Aluminum	0.00	ma/l	0.00	
Antimony	~0.001	mg/L	0.002	0.006
Arsenic		mg/L	0.0001	0.000
Barium	0.0007	mg/L	0.0001	1.0
Bervilium	<0.0000	mg/L	0.0001	1.0
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.015	ma/L	0.010	5.0
Cadmium	< 0.0001	ma/L	0.0001	0.005
Calcium	97.4	ma/L	0.05	
Chromium	0.0001	mg/L	0.0001	0.05
Cobalt	0.0002	mg/L	0.0001	
Copper	0.0059	mg/L	0.0001	
Dissolved Aluminum	<0.002	mg/L	0.002	
Dissolved Antimony	<0.0001	mg/L	0.0001	
Dissolved Arsenic	0.0003	mg/L	0.0001	
Dissolved Barium	0.0544	mg/L	0.0001	
Dissolved Beryllium	<0.0001	mg/L	0.0001	
Dissolved Bismuth	<0.0001	mg/L	0.0001	
Dissolved Boron	0.016	mg/L	0.010	
Dissolved Cadmium	<0.0001	mg/L	0.0001	
Dissolved Calcium	97.9	mg/L	0.05	
Dissolved Chromium	<0.0001	mg/L	0.0001	
Dissolved Cobalt	0.0001	mg/L	0.0001	
Dissolved Copper	0.0013	mg/L	0.0001	
Dissolved Iron	0.016	mg/L	0.003	
Dissolved Lead	<0.0001	mg/L	0.0001	

**Dissolved Lithium** 

mg/L

0.0005

0.0108

ODWS	(Amnd	O Reg	457/16)	.Jan2020

				ODWO (Allina O.Reg.+31/10) Janzozo
Analyte	Result	Units	MDL	02
Dissolved Magnesium	23.8	ma/L	0.05	
Dissolved Manganese	0.0319	ma/L	0.0001	
Dissolved Mercurv	<0.05	ua/L	0.05	
Dissolved Molvbdenum	0.0008	ma/L	0.0001	
Dissolved Nickel	0.0003	ma/L	0.0001	
Dissolved Potassium	1.08	ma/L	0.05	
Dissolved Selenium	<0.0001	ma/L	0.0001	
Dissolved Silicon	7.77	ma/L	0.01	
Dissolved Silver	<0.0001	ma/L	0.0001	
Dissolved Sodium	7.91	ma/L	0.05	
Dissolved Strontium	0.985	ma/L	0.0005	
Dissolved Thallium	< 0.0003	ma/L	0.0003	
Dissolved Tin	< 0.0001	ma/L	0.0001	
Dissolved Titanium	0.0007	ma/L	0.0004	
Dissolved Tungsten	< 0.0001	ma/L	0.0001	
Dissolved Uranium	0.873	ua/L	0.002	
Dissolved Vanadium	< 0.0001	ma/L	0.0001	
Dissolved Zinc	0.013	ma/L	0.001	
Dissolved Zirconium	< 0.0004	mg/L	0.0004	
Hardness (Calculation)	342	mg/L	0.7	
Iron	0.753	mg/L	0.003	
l ead	0.0038	mg/L	0.0001	0.010
Lithium	0.0106	mg/L	0.0005	0.010
Magnesium	23.6	mg/L	0.0000	
Magnesian	0.0398	mg/L	0.001	
Mercury	<0.05	ug/l	0.0001	1
Molybdenum	0.008	mg/L	0.001	·
Nickel	0.0000	mg/L	0.0001	
Phosphorus Dissolved Total	<0.0004	mg/L	0.0001	
Phosphorus Total	0.018	mg/L	0.010	
Potassium	1.08	mg/L	0.010	
Selenium	<0.0001	mg/L	0.001	0.05
Silicon	7 85	mg/L	0.0001	0.00
Silver	~0.0001	mg/L	0.001	
Sodium	7 60	mg/L	0.0001	20
Strontium	0.950	mg/L	0.00	20
Thallium	~0.0003	mg/L	0.0003	
Tin	<0.0000	mg/L	0.0000	
Titanium	0.0053	mg/L	0.0001	
Tungsten	~0.0000	mg/L	0.0004	
Uranium	0.870	ug/L	0.0001	20
Vanadium	0.070	mg/L	0.002	20
Zinc	0.0005	mg/L	0.0001	
Zirconium	~0.0004	mg/L	0.001	
Escherichia coli	<0.0004 0	MPN/100ml	0.000+	0
Total Coliform	13	MPN/100mL	0	0 *
1 1-Dichloroethylene	<0.2		0.2	14
1,1-Dichlorobenzene	<0.2	ug/L	0.2	200
1.2-Dichloroethane	<0.2	ug/L	0.2	5
	<0.2	ug/L	0.2	5
Renzono	~0.2	ug/L	0.2	1
Bromodichloromethano	<0.∠ ∠0.2	ug/L	0.2	·
Bromoform	<0.∠ ∠0.2	ug/L	0.2	
Divinuivilii Carbon Totrachlorida	<0.2	ug/L	0.2	2
	<0.2	ug/L	0.2	2 80
Chloroform	<0.0 ~0.0	ug/L	0.0	00
Dibromochloromotheres	<0.2	ug/L	0.2	
	<0.2	ug/L	0.2	

ODWS (Amnd O.Reg.457/16) Jan2020

Analyte	Result	Units	MDL	02
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethvlene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	< 0.4	ug/L	0.4	100
Trichloroethylene	< 0.2	ug/L	0.2	5
Vinyl Chloride	< 0.2	ug/L	0.2	1
Xvlene (Calculation)	< 0.5	ug/L	0.5	90
		<i></i>	0.0	
MW-101 2023-01-10 15:25:00 Record 686534				
Alkalinity	276	mg/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	6.6	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	276	mg/L	2	
Bromide	<0.2	mg/L	0.2	
Cation Sum (Calculation) †	6.0	me/L	0.1	
Chloride	2.2	mg/L	0.5	
Colour (apparent)	18	CU	2	
Conductivity	553	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	<0.4	mg/L	0.4	
Fluoride	0.12	mg/L	0.04	1.5
Ion Balance (Calculation) †	4.8	%	0.1	
Nitrate as N	1.14	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.14	mg/L	0.03	
Nitrite as N	<0.01	mg/L	0.01	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
Ha	7.94	Йq	0.01	
pH - Saturation (Calculation) †	7.03	Ha	0.01	
Silica-Reactive	14.4	ma/L	0.20	
Sulphate	25.3	ma/L	0.5	
Temperature	21.0	č	0.1	
Total Suspended Solids	<3	ma/l	3	
Turbidity	2.24	NTU	0.05	
Aluminum	0.101	ma/L	0.002	
Antimony	<0.0001	ma/l	0.0001	0.006
Arsenic	0.0002	ma/l	0.0001	0.010
Barium	0.0702	ma/l	0.0001	10
Bervllium	<0.0001	ma/l	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.011	mg/L	0.010	5.0
Cadmium	~0.0001	mg/L	0.0001	0.005
Calcium	88.2	mg/L	0.0001	0.000
Chromium	0.0015	mg/L	0.001	0.05
Cabalt		mg/L	0.0001	0.00
Coppor	0.0001	mg/L	0.0001	
	0.0013	mg/L	0.0001	
Dissolved Antimony	~0.004 ~0.001	mg/L	0.002	
Dissolved Analinony	0.0001	mg/L		
Dissuived Alsenic	0.0002	mg/L		
Dissolved Barlum	0.0710	mg/L	0.0001	
Dissolved Beryllium	<0.0001	mg/L	0.0001	
Dissolved Bismuth	<0.0001	mg/L	0.0001	
	0.011	mg/L	0.010	
Dissolved Cadmium	<0.0001	mg/L	0.0001	

Analyte	Result	Units	MDL	02	
Dissolved Calcium	90.0	ma/l	0.05		—
Dissolved Chromium	0.0008	mg/L	0.0001		
Dissolved Cobalt	<0.0000	mg/l	0.0001		
Dissolved Copper	0.0013	mg/l	0.0001		
Dissolved Iron	<0.003	mg/l	0.003		
Dissolved Lead	<0.0001	mg/L	0.0001		
Dissolved Lithium	0.0054	mg/L	0.0001		
Dissolved Magnesium	14.8	mg/L	0.0000		
Dissolved Magnesian	0 0008	mg/L	0.00		
Dissolved Mangariese	~0.05	ing/⊑	0.0001		
Dissolved Molybdenum	0.002	mg/L	0.00		
Dissolved Nickel	0.0002	mg/L	0.0001		
Dissolved Nicker	0.0001	mg/L	0.0001		
Dissolved Polassium	0.00	mg/L	0.00		
Dissolved Selenidin	6 76	mg/L	0.0001		
Dissolved Silver	~0.0001	mg/L	0.01		
	1 36	mg/L	0.0001		
Dissolved Strontium	4.30	mg/L	0.00		
Dissolved Strollium	0.223	mg/L	0.0005		
Dissolved Mainum	<0.0003	mg/L	0.0003		
Dissolved Titanium	<0.0001	mg/L	0.0001		
Dissolved Ittanium	0.0001	mg/L	0.0004		
Dissolved Tungsten	<0.0001	mg/∟	0.0001		
Dissolved Uranium	0.328	ug/L	0.002		
Dissolved Vanadium	0.0002	mg/L	0.0001		
Dissolved Zinc	0.001	mg/L	0.001		
Dissoived Zirconium	<0.0004	mg/L	0.0004		
Hardness (Calculation)	286	mg/L	0.7		
iron	0.161	mg/L	0.003	0.040	
Lead	<0.0001	mg/L	0.0001	0.010	
Lithium	0.0056	mg/L	0.0005		
Magnesium	15.0	mg/L	0.05		
Manganese	0.0034	mg/L	0.0001		
Mercury	<0.05	ug/L	0.05	1	
Molybdenum	0.0002	mg/L	0.0001		
Nickel	0.0002	mg/L	0.0001		
Phosphorus Dissolved Total	<0.010	mg/L	0.010		
Phosphorus Total	<0.010	mg/L	0.010		
Potassium	0.93	mg/L	0.05		
Selenium	0.0004	mg/L	0.0001	0.05	
Silicon	6.80	mg/L	0.01		
Silver	<0.0001	mg/L	0.0001		
Sodium	4.41	mg/L	0.05	20	
Strontium	0.225	mg/L	0.0005		
Thallium	<0.0003	mg/L	0.0003		
Tin	<0.0001	mg/L	0.0001		
Titanium	0.0094	mg/L	0.0004		
Tungsten	<0.0001	mg/L	0.0001		
Uranium	0.322	ug/L	0.002	20	
Vanadium	0.0004	mg/L	0.0001		
Zinc	<0.001	mg/L	0.001		
Zirconium	<0.0004	mg/L	0.0004		
Escherichia coli	0	MPN/100mL	0	0	
Total Coliform	0	MPN/100mL	0	0	
1,1-Dichloroethylene	<0.2	ug/L	0.2	14	
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200	
1,2-Dichloroethane	<0.2	ug/L	0.2	5	
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5	

				ODWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
Travel Blank 2023-01-10 Record 686535				
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90

Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



# Certificate of Analysis

### **CLIENT INFORMATION**

Client Name: HAMILTON WATER Attention: CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2023-01-17
Date Submitted:	2023-01-17

Laboratory Work Order Number: 342769

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

Analyte	Result	Unite		WS (Amnd O.Reg.457/16) Jan2020 02
lamilton Water	Result	onna	MDL	
Monitoring Wells - Greensville GW - Additional Sam				
TW-1-13 2023-01-17 13:50:00 Record 688640				
Alkalinity	283	ma/L	2	
Ammonia + Ammonium as N	0.04	mg/L	0.01	
Anion Sum (Calculation) †	8.7	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	283	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	8.4	me/L	0.1	
Chloride	26.4	mg/L	0.5	
Colour (apparent)	99	CU	2	
Conductivity	708	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.6	mg/L	0.4	
Fluoride	0.32	mg/L	0.04	1.5
Ion Balance (Calculation) †	1.8	%	0.1	
Nitrate as N	<0.1	mg/L	0.1	10.0
Nitrate+Nitrite as N (Calculation)	<0.2	mg/L	0.2	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
pH	7.62	рН	0.01	
pH - Saturation (Calculation) †	7.01	рн	0.01	
Silica-Reactive	20.9	mg/L	0.20	
	83.6	mg/∟	0.5	
Tetel Supported Solida	18.9	C	0.1	
Tubidity	10.0 5.52		0.8	
Aluminum	0.02	mg/l	0.03	
Antimony	~0.094	mg/L	0.002	0.006
Arisonic	0.0001	mg/L	0.0001	0.000
Barium	0.0024	mg/L	0.0001	1.0
Bervlium	<0.001	mg/L	0.0001	1.0
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.023	ma/L	0.010	5.0
Cadmium	< 0.0001	ma/L	0.0001	0.005
Calcium	107	mg/L	0.05	
Chromium	0.0002	mg/L	0.0001	0.05
Cobalt	0.0001	mg/L	0.0001	
Copper	0.0003	mg/L	0.0001	
Dissolved Aluminum	<0.002	mg/L	0.002	
Dissolved Antimony	<0.0001	mg/L	0.0001	
Dissolved Arsenic	0.0017	mg/L	0.0001	
Dissolved Barium	0.0537	mg/L	0.0001	
Dissolved Beryllium	<0.0001	mg/L	0.0001	
Dissolved Bismuth	<0.0001	mg/L	0.0001	
Dissolved Boron	0.023	mg/L	0.010	
Dissolved Cadmium	<0.0001	mg/L	0.0001	
Dissolved Calcium	105	mg/L	0.05	
Dissolved Chromium	<0.0001	mg/L	0.0001	
Dissolved Cobalt	<0.0001	mg/L	0.0001	
Dissolved Copper	0.0003	mg/L	0.0001	
Dissolved Iron	0.570	mg/L	0.003	
Dissolved Lead	<0.0001	mg/L	0.0001	

**Dissolved Lithium** 

0.0113

mg/L

0.0005

ODWS	(Amnd	O Reg	457/16)	.Jan2020

				00110 (Annu 0.1(cg.+51/10) 00112020
Analyte	Result	Units	MDL	02
Dissolved Magnesium	27.2	mg/L	0.05	
Dissolved Manganese	0.0216	mg/L	0.0001	
Dissolved Mercury	<0.05	ug/L	0.05	
Dissolved Molybdenum	0.0010	mg/L	0.0001	
Dissolved Nickel	0.0002	mg/L	0.0001	
Dissolved Potassium	1.25	mg/L	0.05	
Dissolved Selenium	<0.0001	mg/L	0.0001	
Dissolved Silicon	9.73	mg/L	0.01	
Dissolved Silver	<0.0001	mg/L	0.0001	
Dissolved Sodium	12.3	mg/L	0.05	
Dissolved Strontium	6.47	mg/L	0.0005	
Dissolved Thallium	<0.0003	mg/L	0.0003	
Dissolved Tin	<0.0001	mg/L	0.0001	
Dissolved Titanium	0.0009	mg/L	0.0004	
Dissolved Tungsten	<0.0001	mg/L	0.0001	
Dissolved Uranium	0.200	ug/L	0.002	
Dissolved Vanadium	<0.0001	mg/L	0.0001	
Dissolved Zinc	0.006	mg/L	0.001	
Dissolved Zirconium	< 0.0004	ma/L	0.0004	
Hardness (Calculation)	381	ma/L	0.7	
Iron	1.33	ma/L	0.003	
Lead	0.0013	ma/L	0.0001	0.010
Lithium	0.0117	ma/L	0.0005	
Magnesium	27.6	ma/L	0.05	
Manganese	0.0314	ma/L	0.0001	
Mercury	< 0.05	ua/L	0.05	1
Molybdenum	0.0010	ma/l	0.0001	·
Nickel	0.0002	mg/L	0.0001	
Phosphorus Dissolved Total	<0.000	mg/L	0.010	
Phosphorus Total	0.018	mg/L	0.010	
Potassium	1 29	mg/L	0.05	
Selenium	<0.0001	mg/L	0.0001	0.05
Silicon	9.96	mg/L	0.0001	0.00
Silver	<0.0001	mg/L	0.001	
Sodium	12.2	mg/L	0.0001	20
Strontium	6 46	mg/L	0.0005	20
Thallium		mg/L	0.0003	
Tin	<0.0000	mg/L	0.0000	
Titanium	0.0001	mg/L	0.0001	
Tungsten	~0.001	mg/L	0.0004	
Uranium	0.207	ug/L	0.0001	20
Vanadium	0.0002	ma/L	0.002	20
Zinc	0.0002	mg/L	0.0001	
Zirconium	<0.010	mg/L	0.001	
Escherichia coli	+0.000 0	MPN/100ml	0.0004	0
Total Coliform	0	MPN/100mL	0	0
1 1-Dichloroethylene	<0.2		0.2	14
1,7 Dichlorobenzene	<0.2	ug/L	0.2	200
1.2-Dichloroethane	<0.2	ug/L	0.2	5
	~0.2	ug/L	0.2	5
Ranzana	~0.2	ug/L	0.2	1
Bromodichloromethano	~0.2	ug/L	0.2	·
Bromoform	~0.2	ug/L	0.2	
Carbon Tetrachlorida	<0.∠ ∠0.2	ug/L	0.2	2
	<0.2 ~0.2	ug/L	0.2	2 80
Chloroform	<0.5 ~0.2	ug/L	0.0	00
Dibromochloromothere	<0.2	ug/L	0.2	
	<0.Z	uy/L	0.2	

ODWS (Amnd O.Reg.457/16) Jan2020

Analyte	Result	Units	MDL	02
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinvl Chloride	<0.2	ua/L	0.2	1
Xvlene (Calculation)	<0.5	ua/L	0.5	90
		- <b>G</b>		
TW-2-13 2023-01-17 12:00:00 Record 688641				
Alkalinity	304	mg/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	7.6	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	304	mg/L	2	
Bromide	<1	mg/L	1	
Cation Sum (Calculation) †	7.5	me/L	0.1	
Chloride	10.8	mg/L	0.5	
Colour (apparent)	<2	CU	2	
Conductivity	634	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	<0.4	mg/L	0.4	
Fluoride	0.12	mg/L	0.04	1.5
Ion Balance (Calculation) †	0.7	%	0.1	
Nitrate as N	1.36	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.36	mg/L	0.03	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.84	pН	0.01	
pH - Saturation (Calculation) †	6.93	pН	0.01	
Silica-Reactive	14.2	mg/L	0.20	
Sulphate	36.3	mg/L	0.5	
Temperature	19.7	С	0.1	
Total Suspended Solids	<2	mg/L	2	
Turbidity	0.26	NTU	0.05	
Aluminum	<0.002	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0002	mg/L	0.0001	0.010
Barium	0.0906	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.015	mg/L	0.010	5.0
Cadmium	<0.0001	mg/L	0.0001	0.005
Calcium	110	mg/L	0.05	
Chromium	0.0006	mg/L	0.0001	0.05
Cobalt	<0.0001	mg/L	0.0001	
Copper	0.0004	mg/L	0.0001	
Dissolved Aluminum	<0.002	mg/L	0.002	
Dissolved Antimony	<0.0001	mg/L	0.0001	
Dissolved Arsenic	0.0002	mg/L	0.0001	
Dissolved Barium	0.0917	mg/L	0.0001	
Dissolved Bervllium	<0.0001	mg/L	0.0001	
Dissolved Bismuth	< 0.0001	ma/L	0.0001	
Dissolved Boron	0.015	ma/L	0.010	
Dissolved Cadmium	<0.0001	mg/L	0.0001	
		5		

ODWS (Amnd O.Reg.457/16) Jan2020

Analyte	Result	Units	MDL	02
Dissolved Calcium	111	mg/L	0.05	
Dissolved Chromium	0.0005	mg/L	0.0001	
Dissolved Cobalt	<0.0001	mg/L	0.0001	
Dissolved Copper	0.0004	mg/L	0.0001	
Dissolved Iron	0.007	mg/L	0.003	
Dissolved Lead	<0.0001	mg/L	0.0001	
Dissolved Lithium	0.0070	mg/L	0.0005	
Dissolved Magnesium	17.2	mg/L	0.05	
Dissolved Manganese	0.0016	mg/L	0.0001	
Dissolved Mercury	<0.05	ug/L	0.05	
Dissolved Molybdenum	0.0003	mg/L	0.0001	
Dissolved Nickel	0.0003	mg/L	0.0001	
Dissolved Potassium	0.87	mg/L	0.05	
Dissolved Selenium	0.0003	mg/L	0.0001	
Dissolved Silicon	6.76	mg/L	0.01	
Dissolved Silver	<0.0001	mg/L	0.0001	
Dissolved Sodium	10.9	mg/L	0.05	
Dissolved Strontium	0.611	mg/L	0.0005	
Dissolved Thallium	<0.0003	mg/L	0.0003	
Dissolved Tin	<0.0001	mg/L	0.0001	
Dissolved Titanium	0.0007	mg/L	0.0004	
Dissolved Tungsten	<0.0001	mg/L	0.0001	
Dissolved Uranium	0.547	ug/L	0.002	
Dissolved Vanadium	<0.0001	mg/L	0.0001	
Dissolved Zinc	0.036	mg/L	0.001	
Dissolved Zirconium	<0.0004	mg/L	0.0004	
Hardness (Calculation)	350	mg/L	0.7	
Iron	0.078	mg/L	0.003	
Lead	<0.0001	mg/L	0.0001	0.010
Lithium	0.0070	mg/L	0.0005	
Magnesium	17.6	mg/L	0.05	
Manganese	0.0017	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0003	mg/L	0.0001	
Nickel	0.0003	mg/L	0.0001	
Phosphorus Dissolved Total	<0.010	mg/L	0.010	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	0.89	mg/L	0.05	
Selenium	0.0003	mg/L	0.0001	0.05
Silicon	6.65	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	22
Soalum	11.0	mg/L	0.05	20
Strontium	0.613	mg/L	0.0005	
i nailium	< 0.0003	mg/L	0.0003	
Lin Titorium	<0.0001	mg/L	0.0001	
Turgeter	0.0007	mg/L	0.0004	
Litenium	<0.0001	mg/∟	0.0001	20
Uranium	0.047	ug/L	0.002	20
Variauluiti	<0.0001	mg/∟	0.0001	
ZINC Ziroonium		mg/L	0.001	
Ziiconium Ecoboriobia acti	<0.0004 ∩	MPN/100ml	0.0004 A	0
Total Caliform	0	MPN/100mL	0	0
1 1-Dichloroethylopo	-0 2		02	14
1.2-Dichlorobenzene	<0.2	ug/L	0.2	200
1.2-Dichloroethane	<0.2	ug/L	0.2	5
1 4-Dichlorobenzene	<0.2	ug/L	0.2	5
	20.2	~g/ L	0.2	0

• • · ·	Desist	11		DWS (Amnd O.Reg.457/16) Jan202 02
Analyte	Result	Units	MDL	VL
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
1,1-Dichloroethylene 1,2-Dichlorobenzene	<0.2 <0.2	ug/L ug/L	0.2	200
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
	<0.2	ug/L	0.2	200
1,2-Dichlorobanzana	<0.2	ug/L	0.2	5
1,4-Dichiorobenzene	<0.2	ug/L	0.2	5
Denzene	<0.2	ug/L	0.2	I
Bromodichioroniethane	<0.2	ug/L	0.2	
Biolioiolili Carban Tatraablarida	<0.2	ug/∟	0.2	3
	<0.2	ug/L	0.2	2
Chloroform	<0.3	ug/L	0.3	80
Chioroiorm	<0.2	ug/L	0.2	
Dipromocniorometnane	<0.2	ug/L	0.2	50
	<0.5	ug/L	0.5	50
Etnyibenzene	<0.2	ug/L	0.2	140
m+p-Xyiene	<0.4	ug/L	0.4	
	<0.2	ug/L	0.2	40
	<0.2	ug/L	0.2	10
	<0.2	ug/L	0.2	60
I otal I rihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Irichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90

Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



### **CLIENT INFORMATION**

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-01
Date Submitted:	2022-12-01

Laboratory Work Order Number: 342245

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

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Analyta	Pocult	Unito	C	0DWS (Amnd O.Reg.457/16) Jan2020 02
Hamilton Water	Result	Units	WDL	
Monitoring Wells - Greensville GW - Pre-Pump Test				
3 Medwin Dr 2022-12-01 12:00:00 Record 683444				
Alkalinity	317	mg/L	2	
Ammonia + Ammonium as N	0.01	mg/L	0.01	
Anion Sum (Calculation) †	10.5	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	317	mg/L	2	
Bromide	<0.2	mg/L	0.2	
Cation Sum (Calculation) †	9.7	me/L	0.1	
Chloride	79.9	mg/L	0.5	
Colour (apparent)	65	CU	2	
Conductivity	930	umhos/cm	4	
	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	1.0	mg/L	0.4	15
Fluoride	0.28	mg/L	0.04	1.5
Ion Balance (Calculation) †	4.0	%	0.1	10.0
Nitrate as N	1.78	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.78	mg/L	0.03	1.0
Nitrite as N	<0.01	mg/L	0.01	1.0
0-Phosphale as P	<0.05	mg/L	0.05	
η 	7.00 6.01	рн ъЧ	0.01	
p⊓ - Saturation (Calculation)   Silica Poactivo	12.2	pn ma/l	0.01	
Suica-Reactive	13.2 68.5	mg/L	0.20	
Temperature	21.3	nig/L	0.5	
Total Suspended Solida	21.5	ma/l	0.1	
Turbidity	17.4	NTU	0.0	
Aluminum	0.020	ma/l	0.002	
Antimony	<0.020	mg/L	0.002	0.006
Arsenic	0.0003	mg/L	0.0001	0.010
Barium	0.0693	mg/L	0.0001	1.0
Bervllium	<0.0001	ma/L	0.0001	
Bismuth	< 0.0001	ma/L	0.0001	
Boron	0.025	ma/L	0.010	5.0
Cadmium	< 0.0001	ma/L	0.0001	0.005
Calcium	113	ma/L	0.05	
Chromium	0.0004	mg/L	0.0001	0.05
Cobalt	<0.0001	mg/L	0.0001	
Copper	0.0079	mg/L	0.0001	
Hardness (Calculation)	390	mg/L	0.3	
Iron	0.813	mg/L	0.003	
Lead	0.0024	mg/L	0.0001	0.010
Lithium	0.0102	mg/L	0.0005	
Magnesium	26.1	mg/L	0.05	
Manganese	0.0122	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0012	mg/L	0.0001	
Nickel	0.0019	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	2.27	mg/L	0.05	
Selenium	0.0002	mg/L	0.0001	0.05
Silicon	6.14	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	
Sodium	40.8	mg/L	0.05	20 *

Analida	Pooul4	Unito	0 MDI	DWS (Amnd O.Reg.457/16) Jan2020 02
Analyte	Result	Units	MDL	
Strontium	1.56	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	0.0011	mg/L	0.0001	
Titanium	0.0007	mg/L	0.0004	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	1.49	ug/L	0.002	20
Vanadium	0.0001	mg/L	0.0001	
Zinc	0.051	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	108	MPN/100mL	0	0 *
1.1-Dichloroethvlene	<0.2	ua/L	0.2	14
1.2-Dichlorobenzene	< 0.2	ua/L	0.2	200
1 2-Dichloroethane	<0.2	ug/L	0.2	5
1 4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Drizene	<0.2	ug/L	0.2	I
Diomoulcinoromethane	<0.2	ug/L	0.2	
	<0.2	ug/L	0.2	2
Carbon Letrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ua/L	0.2	5
Vinvl Chloride	<0.2	ua/l	0.2	- 1
Xylene (Calculation)	<0.5	ug/L	0.5	90
	10.0	ag, -	0.0	
63 Tews Ln 2022-12-01 14:30:00 Record 683445				
Alkalinity	280	mg/L	2	
Ammonia + Ammonium as N	0.03	mg/L	0.01	
Anion Sum (Calculation) †	9.4	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	280	mg/L	2	
Bromide	<0.2	ma/L	0.2	
Cation Sum (Calculation) +	8.3	me/l	0.1	
Chloride	40.6	ma/l	0.5	
Colour (apparent)	445	CII	2	
	706	umbos/cm	2 /	
	1 90	mc/l	4 0.002	0.2
Cyanide - Total Disserved Organia Organia	<0.003	mg/L	0.003	0.2
	1.1	mg/∟	0.4	4.5
Fluoride	0.31	mg/∟	0.04	1.5
Ion Balance (Calculation) †	5.8	%	0.1	
Nitrate as N	0.02	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	<0.03	mg/L	0.03	
Nitrite as N	<0.01	mg/L	0.01	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.82	рН	0.01	
pH - Saturation (Calculation) †	7.02	рН	0.01	
Silica-Reactive	21.8	mg/L	0.20	
Sulphate	96.5	mg/L	0.5	
Temperature	21.6	Č	0.1	

Analyte	Result	Units	MDL	02 02 (Annu O.Keg.45//16) 02
Total Suspended Solids	96.0	mg/L	0.8	
Turbidity	108	NŤU	0.05	
Aluminum	0.063	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0040	mg/L	0.0001	0.010
Barium	0.0544	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.028	mg/L	0.010	5.0
Cadmium	<0.0001	mg/L	0.0001	0.005
Calcium	96.8	mg/L	0.05	
Chromium	0.0004	mg/L	0.0001	0.05
Cobalt	0.0001	mg/L	0.0001	
Copper	0.0011	mg/L	0.0001	
Hardness (Calculation)	363	mg/L	0.3	
Iron	2.94	mg/L	0.003	
Lead	0.0006	mg/L	0.0001	0.010
Lithium	0.0106	mg/L	0.0005	
Magnesium	29.5	mg/L	0.05	
Manganese	0.0401	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0011	mg/L	0.0001	
Nickel	0.0009	mg/L	0.0001	
Phosphorus Total	0.011	mg/L	0.010	
Potassium	1.33	mg/L	0.05	
Selenium	<0.0001	mg/L	0.0001	0.05
Silicon	9.50	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	
Sodium	17.0	mg/L	0.05	20
Strontium	6.79	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	0.0015	mg/L	0.0001	
Titanium	0.0038	mg/L	0.0004	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	0.151	ug/L	0.002	20
Vanadium	0.0002	mg/L	0.0001	
Zinc	0.006	mg/L	0.001	
Zirconium	<0.0004	mg/L	0.0004	-
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	9	MPN/100mL	0	0 *
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	_
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60

			c	DWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
609 Harvest Rd 2022-12-01 13:00:00 Record 683446				
Alkalinity	308	ma/L	2	
Ammonia + Ammonium as N	<0.01	mg/L	0.01	
Anion Sum (Calculation) †	10.1	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	308	mg/L	2	
Bromide	<0.2	mg/L	0.2	
Cation Sum (Calculation) †	8.8	me/L	0.1	
Chloride	66.5	mg/L	0.5	
Colour (apparent)	44	CU	2	
Conductivity	895	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	1.2	mg/L	0.4	
Fluoride	0.44	mg/L	0.04	1.5
Ion Balance (Calculation) †	6.9	%	0.1	
Nitrate as N	1.34	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	1.34	mg/L	0.03	
Nitrite as N	<0.01	mg/L	0.01	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.74	pН	0.01	
pH - Saturation (Calculation) †	6.94	pН	0.01	
Silica-Reactive	13.0	mg/L	0.20	
Sulphate	76.9	mg/L	0.5	
Temperature	22.3	С	0.1	
Total Suspended Solids	44.4	mg/L	0.8	
Turbidity	12.8	NTU	0.05	
Aluminum	0.057	mg/L	0.002	
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0004	mg/L	0.0001	0.010
Barium	0.0659	mg/L	0.0001	1.0
Beryllium	<0.0001	mg/L	0.0001	
Bismuth	<0.0001	mg/L	0.0001	
Boron	0.036	mg/L	0.010	5.0
Cadmium	<0.0001	mg/L	0.0001	0.005
Calcium	103	mg/L	0.05	
Chromium	0.0009	mg/L	0.0001	0.05
Cobalt	0.0012	mg/L	0.0001	
Copper	0.0050	mg/L	0.0001	
Hardness (Calculation)	370	mg/L	0.3	
Iron	1.61	mg/L	0.003	
Lead	0.0024	mg/L	0.0001	0.010
Lithium	0.0114	mg/L	0.0005	
Magnesium	27.4	mg/L	0.05	
Manganese	0.0755	mg/L	0.0001	
Mercury	<0.05	ug/L	0.05	1
Molybdenum	0.0014	mg/L	0.0001	
Nickel	0.0037	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	2.23	mg/L	0.05	
Selenium	0.0002	mg/L	0.0001	0.05
Silicon	5.96	mg/L	0.01	
Silver	<0.0001	mg/L	0.0001	

Analvte	Result	Units	MDL	02	2020
Sodium	26.8	ma/l	0.05	20 *	
Strontium	20.0	mg/L	0.005	20	
Thallium		mg/L	0.0003		
Tin	0.0000	mg/L	0.0003		
Titanium	0.0003	mg/L	0.0001		
Tungsten	~0.0010	mg/L	0.0004		
Iranium	2.02	ug/L	0.0001	20	
Vanadium	0.0004	mg/L	0.002	20	
Zinc	0.0004	mg/L	0.0001		
Zirconium	<0.091	mg/L	0.001		
Escherichia coli	<0.0004	MPN/100ml	0.0004	0	
Total Coliform	276	MPN/100mL	0	0 *	
1 1-Dichloroethylene	<0.2		0.2	14	
1, 1-Dichlorobenzene	<0.2	ug/L	0.2	200	
1.2-Dichloroethane	<0.2	ug/L	0.2	5	
	<0.2	ug/L	0.2	5	
I,4-Dicilioloberizerie Bonzono	<0.2	ug/L	0.2	1	
Delizene	<0.2 20.2	ug/L	0.2	I	
Bromotionioniethane	<0.2	ug/L	0.2		
	<0.2	ug/L	0.2	2	
	<0.2	ug/L	0.2	2	
Chlorobenzene	<0.3	ug/L	0.3	80	
Chiorotorm	<0.2	ug/L	0.2		
Dipromocnioromethane	<0.2	ug/L	0.2	50	
Dichloromethane	<0.5	ug/L	0.5	50	
Ethylbenzene	<0.2	ug/L	0.2	140	
m+p-Xylene	<0.4	ug/L	0.4		
o-Xylene	<0.2	ug/L	0.2		
I etrachloroethylene	<0.2	ug/L	0.2	10	
Ioluene	<0.2	ug/L	0.2	60	
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100	
Trichloroethylene	<0.2	ug/L	0.2	5	
Vinyl Chloride	<0.2	ug/L	0.2	1	
Xylene (Calculation)	<0.5	ug/L	0.5	90	
Travel Blank 2022-12-01 Record 683447					
Dissolved Organic Carbon	<0.4	mg/L	0.4		
1,1-Dichloroethvlene	<0.2	ug/L	0.2	14	
1.2-Dichlorobenzene	<0.2	ug/L	0.2	200	
1.2-Dichloroethane	<0.2	ug/L	0.2	5	
1.4-Dichlorobenzene	<0.2	ug/L	0.2	5	
Benzene	<0.2	ua/L	0.2	1	
Bromodichloromethane	< 0.2	ua/L	0.2		
Bromoform	< 0.2	ua/L	0.2		
Carbon Tetrachloride	<0.2	ua/l	0.2	2	
Chlorohenzene	<0.3	ug/L	0.3	- 80	
Chloroform	<0.2	ua/l	0.2		
Dibromochloromethane	<0.2	ua/l	0.2		
Distolloromethane	<0.2	ug/L	0.5	50	
Fthulbenzene	<0.0	ug/L	0.0	140	
Luiyibelizelle m±n_Vulono	~0.2	ug/L	0.2	עדי	
	_0.4 ∠∩ າ	ug/L	0. <del>4</del> 0.2		
U-Aylene Totrochloroothulono	<0.2	ug/L	0.2	10	
	<0.2 20.2	ug/L	0.2	60	
I Oluene	<0.2	ug/L	0.2	100	
	<0.4	ug/L	0.4	F	
	<0.2	ug/L	0.2	5 1	
vinyi Chloride	<0.2	ug/∟	0.2	I	

		Analyte	Result	Units	O MDL	DWS (Amnd O.Reg.4 02	157/16) Jan2020
		Xylene (Calculation)	<0.5	ug/L	0.5	90	
_	_	 					

Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



# Certificate of Analysis

### **CLIENT INFORMATION**

Client Name:	HAMILTON WATER
Attention:	CARMEN VEGA

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2022-12-12
Date Submitted:	2022-12-13

Laboratory Work Order Number: 342367

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

	ODWS (Amnd O.Reg.457/				Reg.457/16) Jan2020
Analyte	Result	Units	MDL	-	02
Hamilton Water					
Monitoring Wells - Greensville GW - Pre-Pump Test					
TW-1-13 2022-12-12 15:00:00 Record 684296					
Alkalinity	286	mg/L	2		
Ammonia + Ammonium as N	0.05	mg/L	0.01		
Anion Sum (Calculation) †	8.2	me/L	0.1		
Bicarbonate as Carbonate (Calculation)	286	mg/L	2		
Bromide	<1	mg/L	1		
Cation Sum (Calculation) †	40.3	me/L	0.1		
Chloride	8.9	mg/L	0.5		
Colour (apparent)	30200	CU	2		
Conductivity	652	umhos/cm	4		
Cyanide - Total	<0.003	mg/L	0.003	0.2	
Dissolved Organic Carbon	1.6	mg/L	0.4		
Fluoride	0.24	mg/L	0.04	1.5	
Ion Balance (Calculation) †	66.3	%	0.1		
Nitrate as N	<0.1	mg/L	0.1	10.0	
Nitrate+Nitrite as N (Calculation)	<0.2	mg/L	0.2	4.0	
Nitrite as N	<0.05	mg/L	0.05	1.0	
o-Phosphate as P	<0.05	mg/L	0.05		
P⊓ PH	7.40	рн	0.01		
pri - Saturation (Calculation)	0.47	p⊓ ma/l	0.01		
Silica-Reactive	19.7	mg/∟	0.20		
Sulphate	20.5	nig/L	0.5		
Total Suspended Solids	20.3 6650	ma/l	0.1		
Turbidity	4580	NTU	0.0		
Aluminum	32.5	ma/l	0.002		
Antimony	0.0004	ma/L	0.0001	0.006	
Arsenic	0.303	ma/L	0.0001	0.010	*
Barium	0.382	ma/L	0.0001	1.0	
Beryllium	0.0015	mg/L	0.0001	-	
Bismuth	0.0004	mg/L	0.0001		
Boron	0.046	mg/L	0.010	5.0	
Cadmium	0.0007	mg/L	0.0001	0.005	
Calcium	446	mg/L	0.5		
Chromium	0.0530	mg/L	0.0001	0.05	*
Cobalt	0.0304	mg/L	0.0001		
Copper	0.0812	mg/L	0.0001		
Hardness (Calculation)	1400	mg/L	2		
Iron	217	mg/L	0.03		
Lead	0.694	mg/L	0.0001	0.010	*
Lithium	0.0765	mg/L	0.0005		
Magnesium	70.3	mg/L	0.05		
Manganese	2.76	mg/L	0.0001		
Mercury	<0.05	ug/L	0.05	1	
Molybdenum	0.0016	mg/L	0.0001		
Nickel	0.0661	mg/L	0.0001		
Phosphorus Total	3.88	mg/L	0.010		
Potassium	6.38	mg/L	0.05	o	
Selenium	0.0002	mg/L	0.0001	0.05	
Silicon	52.1	mg/L	0.01		
Silver	0.0002	mg/L	0.0001		

mg/L

0.05

Sodium

8.12

20

Analyda	Recult	Unite	0 MDI	DWS (Amnd O.Reg.457/16) Jan2020 02
Allalyte	Result	Units	MDL	
Strontium	6.65	mg/L	0.0005	
Thallium	0.0005	mg/L	0.0003	
Tin	0.0008	mg/L	0.0001	
Titanium	0.622	mg/L	0.0004	
Tungsten	0.0007	mg/L	0.0001	
Uranium	0.662	ug/L	0.002	20
Vanadium	0.0693	mg/L	0.0001	
Zinc	0.774	mg/L	0.001	
Zirconium	0.0153	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	0	MPN/100mL	0	0
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ua/L	0.2	1
Bromodichloromethane	<0.2	ua/L	0.2	
Bromoform	< 0.2	ua/l	0.2	
Carbon Tetrachloride	<0.2	ua/l	0.2	2
Chlorobenzene	<0.2	ug/L	0.2	80
Chloroform	<0.0	ug/L	0.0	80
Dibromochloromothano	<0.2	ug/L	0.2	
Dibiomochioromethane	<0.Z	ug/L	0.2	50
Dichloromethane	<0.5	ug/L	0.5	50
Etnyibenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
I etrachloroethylene	<0.2	ug/L	0.2	10
Toluene	3.1	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
W-3-13 2022-12-12 15:30:00 Record 684297				
Alkalinity	274	ma/L	2	
Ammonia + Ammonium as N	0.03	ma/L	0.01	
Anion Sum (Calculation) †	7.6	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	274	ma/l	2	
Bromide	-1	mg/L	1	
Cation Sum (Calculation) t	71	me/l	0.1	
Chlorido	1/2	mg/L	0.1	
	12000	nig/L	0.5	
Colour (apparent)	13900		2	
	596	umnos/cm	4	<u> </u>
Cyanide - Total	<0.003	mg/L	0.003	0.2
	1.9	mg/L	0.4	
Fluoride	0.19	mg/L	0.04	1.5
Ion Balance (Calculation) †	1.7	%	0.1	
Nitrate as N	<0.1	mg/L	0.1	10.0
Nitrate+Nitrite as N (Calculation)	<0.2	mg/L	0.2	
Nitrite as N	<0.05	mg/L	0.05	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
pH	7.58	рН	0.01	
pH - Saturation (Calculation) †	7.03	рН	0.01	
Silica-Reactive	13.9	mg/L	0.20	
Sulphate	66.1	mg/L	0.5	
Temperature	20.6	C	0.1	

Analyte	Result	Units	MDL	02 (Amna O.Reg.457/16) Jan2020 02
Total Suspended Solids	3610	ma/l	0.8	
Turbidity	3640	NTU	0.05	
Aluminum	0.243	ma/L	0.002	
Antimony	0.0002	ma/L	0.0001	0.006
Arsenic	0.0024	ma/L	0.0001	0.010
Barium	0.0461	ma/L	0.0001	1.0
Bervllium	< 0.0001	mg/L	0.0001	
Bismuth	< 0.0001	mg/L	0.0001	
Boron	0.015	mg/L	0.010	5.0
Cadmium	0.0003	mg/L	0.0001	0.005
Calcium	95.0	mg/L	0.05	
Chromium	0.0013	mg/L	0.0001	0.05
Cobalt	0.0009	mg/L	0.0001	
Copper	0.0038	mg/L	0.0001	
Hardness (Calculation)	335	mg/L	0.3	
Iron	7.31	mg/L	0.003	
Lead	0.0129	mg/L	0.0001	0.010 *
Lithium	0.0098	mg/L	0.0005	
Magnesium	23.7	mg/L	0.05	
Mandanese	0.0665	mg/L	0.0001	
Mercurv	< 0.05	ua/L	0.05	1
Molvbdenum	0.0009	ma/L	0.0001	
Nickel	0.0062	ma/L	0.0001	
Phosphorus Total	0.031	ma/L	0.010	
Potassium	1.21	ma/L	0.05	
Selenium	0.0005	ma/L	0.0001	0.05
Silicon	7.93	ma/L	0.01	
Silver	< 0.0001	ma/L	0.0001	
Sodium	7.95	ma/L	0.05	20
Strontium	0.425	mg/L	0.0005	
Thallium	0.0003	ma/L	0.0003	
Tin	< 0.0001	ma/L	0.0001	
Titanium	0.0072	mg/L	0.0004	
Tunasten	0.0002	ma/L	0.0001	
Uranium	1.11	ua/L	0.002	20
Vanadium	0.0024	ma/L	0.0001	
Zinc	0.237	ma/L	0.001	
Zirconium	0.0007	ma/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	1	MPN/100mL	0 0	0 *
1.1-Dichloroethvlene	<0.2	ua/L	0.2	- 14
1.2-Dichlorobenzene	<0.2	ua/L	0.2	200
1.2-Dichloroethane	<0.2	ua/L	0.2	5
1.4-Dichlorobenzene	<0.2	ug/L	0.2	5
Renzene	<0.2	ua/l	0.2	1
Bromodichloromethane	<0.2	ua/l	0.2	•
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ua/l	0.2	2
Chlorohenzene	<0.3	ua/l	0.3	- 80
Chloroform	<0.2	ua/l	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	~0.2	ug/L	0.5	50
Fthylhonzone	~0.0	ug/L	0.0	140
m+n-Xvlana	<0.2 <0.4	ug/L	0.4	
n-Xvlene	<0. <del>1</del> <0.2	ug/L	0.7	
Tetrachloroethylene	~0.2	ug/L	0.2	10
Toluone	~0.2	ug/L	0.2	60
I Uluelle	<0.Z	ug/L	0.2	00

Analyte	Result	Units	MDL	ODWS (Amnd O.Reg.457/16) Jan2020 02
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
Travel Blank 2022-12-12 Record 684298				
Dissolved Organic Carbon	<0.4	mg/L	0.4	
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90

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Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



### **CLIENT INFORMATION**

Address: 100 KING STREET WEST, LEVEL 9 HAMILTON L8P 1A2

### LABORATORY INFORMATION

Sample Date:	2023-05-16
Date Submitted:	2023-05-16

Laboratory Work Order Number: 343966

Samples in this work order were analyzed using the following methods:

o-Phosphate Colourimetric	Alk/pH/Cond/Temp PC Titrate	Ammonia Skalar	Anions IC
Bacteria MPN	Colour Spectrophotometric	Cyanide Skalar	Fluoride-PC Titrate
LIMS Calculation	Mercury Cold Vapour AA	Metals ICP/MS	Silica Skalar
TOC/DOC Colourimetric	TSS/VSS Gravimetric	Turbidity Turbimeter	Volatile Organics-Purge&Trap/GC/MS

#### NOTES:

'<' = less than the Method Detection Limit (MDL), 'IS' = Insufficient Sample, '>' = greater than the reported result.

Results have been compared to the stated specification, without taking into account measurement uncertainty. An asterisk (\*) indicates the result has been found to be outside of that specification.

CHEL is accredited by CALA to ISO/IEC 17025 for specific parameters on its scope of accreditation.

" † " indicates the analyte is not accredited to ISO/IEC 17025.

Methods used by the City of Hamilton's Environmental Laboratory (CHEL) are based upon or modified from those found in published reference methods. Specific information on the methods used and equations used for calculated analytes are available upon request. All analytical work performed at the CHEL is done according to accepted quality assurance and quality control procedures. Quality and other related data as well as uncertainty values are available upon request.

The results on this Certificate of Analysis relate only to the sample as received and analyzed. Field data provided by the customer is identified as such and can affect the validity of CHEL's results. The Certificate of Analysis shall not be reproduced except in full without approval of CHEL.

A	Desult	l Inite	MDI	ODWS (Amnd O.Reg.457/16) Jan2020 02
Analyte Analyte	Result	Units	MDL	52
Monitoring Wells - Greensville GW - Post Pump Test				
63 Tews Ln 2023-05-16 11:31:00 Record 695093				
Alkalinity	269	mg/L	2	
Ammonia + Ammonium as N	0.04	mg/L	0.01	
Anion Sum (Calculation) †	9.0	me/L	0.1	
Bicarbonate as Carbonate (Calculation)	269	mg/L	2	
Bromide	<0.2	mg/L	0.2	
Cation Sum (Calculation) †	8.6	me/L	0.1	
Chloride	38.1	mg/L	0.5	
Colour (apparent)	26	CU	2	
Conductivity	775	umhos/cm	4	
Cyanide - Total	<0.003	mg/L	0.003	0.2
Dissolved Organic Carbon	0.6	mg/L	0.4	
Fluoride	0.32	mg/L	0.04	1.5
Ion Balance (Calculation) †	2.2	%	0.1	
Nitrate as N	<0.02	mg/L	0.02	10.0
Nitrate+Nitrite as N (Calculation)	<0.03	mg/L	0.03	
Nitrite as N	<0.01	mg/L	0.01	1.0
o-Phosphate as P	<0.05	mg/L	0.05	
рН	7.82	рН	0.01	
pH - Saturation (Calculation) †	6.97	рН	0.01	
Silica-Reactive	21.5	mg/L	0.20	
Sulphate	94.2	mg/L	0.5	
	22.3	C "	0.1	
Total Suspended Solids	<1	mg/L	1	
	2.19	NIU	0.05	
Aluminum	<0.002	mg/L	0.002	0.000
Antimony	<0.0001	mg/L	0.0001	0.006
Arsenic	0.0019	mg/L	0.0001	0.010
Dallulli Darillium	0.0529	mg/L	0.0001	1.0
Beryillum	<0.0001	mg/L	0.0001	
Bisliuun	<0.0001	mg/L	0.0001	5.0
Cadmium	~0.020	mg/L	0.010	0.005
Calcium	109	mg/L	0.0001	0.000
Chromium		mg/L	0.00	0.05
Cobalt	<0.0001	mg/L	0.0001	0.00
Copper	0.0001	mg/L	0.0001	
Hardness (Calculation)	386	mg/L	0.0001	
Iron	0.830	ma/L	0.003	
Lead	0.0001	ma/L	0.0001	0.010
Lithium	0.0117	ma/L	0.0005	
Magnesium	27.7	mg/L	0.05	
Manganese	0.0234	mg/L	0.0001	
Mercurv	<0.05	ug/L	0.05	1
Molybdenum	0.0011	mg/L	0.0001	
Nickel	0.0002	mg/L	0.0001	
Phosphorus Total	<0.010	mg/L	0.010	
Potassium	1.26	mg/L	0.05	
Selenium	<0.0001	mg/L	0.0001	0.05
Silicon	10.3	mg/L	0.01	

Silver

Sodium

< 0.0001

15.6

mg/L

mg/L

0.0001

0.05

20

			O	DWS (Amnd O.Reg.457/16) Jan2020
Analyte	Result	Units	MDL	02
Strontium	6.28	mg/L	0.0005	
Thallium	<0.0003	mg/L	0.0003	
Tin	<0.0001	mg/L	0.0001	
Titanium	0.0006	mg/L	0.0001	
Tungsten	<0.0001	mg/L	0.0001	
Uranium	0.167	ug/L	0.002	20
Vanadium	<0.0001	mg/L	0.0001	
Zinc	0.013	mg/L	0.001	
Zirconium	< 0.0004	mg/L	0.0004	
Escherichia coli	0	MPN/100mL	0	0
Total Coliform	0	MPN/100mL	0	0
1,1-Dichloroethylene	<0.2	ug/L	0.2	14
1,2-Dichlorobenzene	<0.2	ug/L	0.2	200
1,2-Dichloroethane	<0.2	ug/L	0.2	5
1,4-Dichlorobenzene	<0.2	ug/L	0.2	5
Benzene	<0.2	ug/L	0.2	1
Bromodichloromethane	<0.2	ug/L	0.2	
Bromoform	<0.2	ug/L	0.2	
Carbon Tetrachloride	<0.2	ug/L	0.2	2
Chlorobenzene	<0.3	ug/L	0.3	80
Chloroform	<0.2	ug/L	0.2	
Dibromochloromethane	<0.2	ug/L	0.2	
Dichloromethane	<0.5	ug/L	0.5	50
Ethylbenzene	<0.2	ug/L	0.2	140
m+p-Xylene	<0.4	ug/L	0.4	
o-Xylene	<0.2	ug/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Trihalomethanes (Calculation)	<0.4	ug/L	0.4	100
Trichloroethylene	<0.2	ug/L	0.2	5
Vinyl Chloride	<0.2	ug/L	0.2	1
Xylene (Calculation)	<0.5	ug/L	0.5	90
ravel Blank 2023-05-16 Record 695094				
1.1-Dichloroethvlene	<0.2	ug/L	0.2	14
1.2-Dichlorobenzene	<0.2	ug/L	0.2	200
1.2-Dichloroethane	<0.2	ug/L	0.2	5
1.4-Dichlorobenzene	<0.2	ua/L	0.2	5
Benzene	<0.2	ua/L	0.2	1
Bromodichloromethane	<0.2	ua/L	0.2	
Bromoform	<0.2	ua/L	0.2	
Carbon Tetrachloride	<0.2	ua/L	0.2	2
Chlorobenzene	< 0.3	ua/L	0.3	- 80
Chloroform	<0.2	ua/L	0.2	
Dibromochloromethane	<0.2	ua/L	0.2	
Dichloromethane	<0.5	ua/L	0.5	50
Fthylbenzene	<0.2	ug/L	0.2	140
m+n-Xvlene	<0.4	ua/L	0.4	
o-Xvlene	<0.2	ua/L	0.2	
Tetrachloroethylene	<0.2	ug/L	0.2	10
Toluene	<0.2	ug/L	0.2	60
Total Tribalomethanes (Calculation)	<0.4	ua/l	0.4	100
Trichloroethylene	<0.7	ua/l	0.7	5
Vinvl Chloride	<0.2	ug/L	0.2	1
Xvlene (Calculation)	<0.5	ua/L	0.5	90
Aylone (Galoulation)	-0.0	~g/ L	0.0	~~~
				ODWS (Amnd O.Reg.457/16) Jan2020
---------	--------	-------	-----	----------------------------------
Analyte	Result	Units	MDL	02

Report Comment: The ODWS does not specify a MAC for sodium, however, as per section 18 of the SDWA, sodium results above 20 mg/L on a regulatory sample are prescribed as adverse results with a duty to report as specified in the applicable regulation.



# York Region

## York-Durham Regional Environmental Laboratory

901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664

## LABORATORY ANALYSIS REPORT



Work Order #:	98457	Work ID:	REL22-5371
Project Description	on: Johnson Tews Park 72hr Pump Test TW-2-13		
Client:	City of Hamilton	Report To:	Marco Silverio
Profile:	Non-regulated Water Sampling		City of Hamilton
Sampled By:	Marco Silverio		Level 9
Sample Count:	3		Hamilton, marco.silverio@hamilton.ca

## Authorized by: Sarah Ostler, Acting Laboratory Supervisor

## **Workorder Summary**

## Workorder Comments

Cryptosporidium and Giardia Internal Control – Percent Recovery: Cryptosporidium, 75%; Giardia, 73%. Microscopic Particulate Analysis - Parameter results have been adjusted to reflect 100L of the original sample volume.

## Analysis Results Comments

9845701 (TW-2-13) - Filtered Volume

Value provided by client.

## Task Comments

#### 9845701 - 4439555 - MBI/69858

The bioindicators Giardia, Cryptosporidium, Diatoms, Other Algae, Rotifers, Insect/Larvae and Plant Debris (Chlorophyll containing), were calculated to have a relative risk factor of 0 (not significant). According to the USEPA Consensus method (1992, EPA910/9-92-029) the relative risk score of surface water contamination is 0 – Low Risk.

Analytic	cal Results									
Parameter		Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	С
Lab ID: Matrix: Type:	9845701 Water Ground Water	Sample ID: Location: Description:	TW-2-13 MPA Enviroche	<b>Criteria:</b> k - HV	Cryp	otospo	oridium & Giar	rdia Date Date	e Received: Collected:	12/14/2022 12/13/2022
CRYPTOSP	ORIDIUM / GIARE	DIA (RELM-9)								
Filtered Volum	ne	333	L					12/15/2022	12/17/2022	
Cryptosporidiu	um oocysts	0	n/a	1	1	1	0	12/15/2022	12/17/2022	
Giardia cysts		0	n/a	1	1	1	0	12/15/2022	12/17/2022	
PHYTOPLA	NKTON (RELM-1	5)								
Algae 2-7um		0	n/a		3.6	1		12/19/2022	12/19/2022	
Algae 7-15um	L	0	n/a		3.6	1		12/19/2022	12/19/2022	
Algae >15um		0	n/a		3.6	1		12/19/2022	12/19/2022	
Amoebae		0	n/a		3.6	1		12/19/2022	12/19/2022	
Crustaceans,	Parts	0	n/a		3.6	1		12/19/2022	12/19/2022	
Diatoms		0	n/a		3.6	1		12/19/2022	12/19/2022	
Filtered Volum	ne	333	L					12/19/2022	12/19/2022	*
			_							

Report Date: 12/20/2022 11:10:34 AM

#### Report ID: 98457-4448508

Page 1 of 3

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

Legend: MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; \* = Comment Present



DNA-

Male-Spec. Coliphage RNA

## York-Durham Regional Environmental Laboratory

901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664

## LABORATORY ANALYSIS REPORT

Work ID:

12/14/2022

12/15/2022



REL22-5371

#### Work Order #: 98457

Analyti	cal Results									
Parameter		Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	С
Gastrotrichs		0	n/a		3.6	1		12/19/2022	12/19/2022	
Insects, Parts	3	0	n/a		3.6	1		12/19/2022	12/19/2022	
Invertebrate e	eggs	0	n/a		3.6	1		12/19/2022	12/19/2022	
Nematodes, e	eggs	0	n/a		3.6	1		12/19/2022	12/19/2022	
Pollen		0	n/a		3.6	1		12/19/2022	12/19/2022	
Protozoa		0	n/a		3.6	1		12/19/2022	12/19/2022	
Rotifers, eggs	5	0	n/a		3.6	1		12/19/2022	12/19/2022	
Spores		0	n/a		3.6	1		12/19/2022	12/19/2022	
Tardigrades		0	n/a		3.6	1		12/19/2022	12/19/2022	
Vegetative de	ebris	0	n/a		3.6	1		12/19/2022	12/19/2022	
Lab ID: Matrix: Type:	9845702 Water Ground Water	Sample ID: Location: Description:	TW-2-13 F - Coliphage Bed Rock Well	Criteria:	N/A			Date Date	Received: Collected:	12/14/2022 12/13/2022
COLIPHAG	ES (RELM-16)									
Male-Spec. C DNA+RNA	Coliphage	0	PFU/100mL	1	1	1		12/14/2022	12/15/2022	
Male-Spec. C	Coliphage RNA	0	PFU/100mL	1	1	1		12/14/2022	12/15/2022	
Lab ID:	9845703	Sample ID:	Surface Water	Criteria:	N/A			Date Date	Received: Collected:	12/14/2022 12/13/2022
Matrix:	Water	Location:	F - Coliphage							
Type:	Surface Water	Description:								
COLIPHAG	ES (RELM-16)									
Male-Spec. C	Coliphage	0	PFU/100mL	1	1	1		12/14/2022	12/15/2022	

Report Date: 12/20/2022 11:10:34 AM

Report ID: 98457-4448508

1

1 1

0 PFU/100mL

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

MDL = Method Detection Limit; RDL = Reporting Detection Limit; MU = Measurement Uncertainty; < or ND = Less Than or Non-detect; ^ = Result outside limit; Limit = MAC; DF = Dilution Factor; OG = Operational Guideline; AO = Aesthetic Objective; HC = Health Canada; C = Comment; \* = Comment Present Legend:



901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664



## LABORATORY ANALYSIS REPORT

## Work Order #: 98457

Work ID:

REL22-5371

Vork Region 901 McKay Road, Pic Fax: 905-686-0664 Er	York Regi kering ON L1W 3A3 Tr nail: re(@durham.ca W	-Durham onal Environmental Laboratory bil Free: 1-877-551-8877 Local: 905-686-0041 Jeb: www.durham.ca	RE	EL22	2-537	1		Non-re Wastewa <sub>Chain</sub>	egulate ater,Bi	ed W oso ody Fo	Page ater id,S	; oil	of Kl	
Company Name:	it	of Hamilton	Invoice Te	D (leave bla	ink if same as	Client)	Rep	ort to (email address)	01	· ot				
Facility Name:	Hamell	white /watershe / threesen					2)	Mario, reven	of le ha	millo	n·Ca			
Facility Address:	100 King	t. West Lowel 9	Quote #:				3)	higebbie @	erropt	obe		£		
Facility Contact:	Marco Si	Inerio	PO #:				4)							
Email: marco	. relveis@1	analism en Tel: (905) 5462424 241	099				5)							
Project Informa	ation (if applicable)	DL DL P TEt trait	Standard T	urnaround 1	lime (TAT) is 1	) business dave	T *RUSH		and the end of					
Description: Jov	mation	144 +24 hump, 124 10-2-13	1					Rush TAT requires lab ap	proval in adv	ance. Su	ircharge	will appl	у. 	
Lab ID	5				Γ	Collec	ction		Co	ntainer		Chlo	vrine	Apply Criteria
( lab use only )	Field ID	Location/Description/Comment(s)		Matrix	Туре	mm-dd-yy	HH:MM	Test Group(s)	Туре	Sent	Rec'd	Free	Total	(Y/N) (*1)
-01	TW-2-13	MPA Envirochek - HV			and the	12-13-22	16:15	MBCGMPA	Contridas		1			
					Gw				0					
02	Tw-2-13	F. Willinge - DEDA	POCK		Gnw	12-13-22	16:10	F- Coliphase	Bottler		2			
		3 weu	L					MBCPF						
03	Surface	F- Coliphage			6mm	12-13-22	15:41	F-Coliphan	Bottles		2			
		1 8			8W			MRCPE						
		OK SEE	UNG	F	of A	TTACHE	o er	LAIL						
						Dec	14/20	22 RK						
Sampled By:	MA	ARCO SILVERIO		Tel:	(905)544	2424 ent	(1) Se 6099 🗖	elect One Applicable Criteria Sanitary Sewer Use By-law	a Provid	de Munic	ipality /	City / De	scription	
								Storm Sewer Use By-law						
Relinquished By (	Print/Sign):	MARCO SILVIERIO		Date/Time:	December 1	3.7.022		New Water Main						
1. A. A.		M-FD				17:4	16 12	Other	Grand	1.	1. 1. 10	Rum	do la	t
LABORATORY US	SEONLY								0.000000	a log )	10 00		1 in	- <i>n</i>
Delivery Method: Sorted by: Checked by:	Jelivery Method:     Courier     Drop Off     YDREL Pickup       Sorted by:													
REL-COC-NONREG	-NOV-2019-REV-1						incomp	lete COC	Tem	P -	15.	<b>ລ</b> ັດ		

Report Date: 12/20/2022 11:10:34 AM

Report ID: 98457-4448508

The results pertain to the items tested and apply to the sample as received. This report shall not be reproduced, except in full, without the written consent of York-Durham Regional Environmental Laboratory. All supporting analytical information including measurement uncertainty is available upon request. The statement of conformity is based on simple acceptance, whether the result is within or outside the acceptance limits. The uncertainty is not taken into account in the statement of conformity. The end user is responsible for determining conformity.

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# York Region

## York-Durham Regional Environmental Laboratory

901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664

## LABORATORY ANALYSIS REPORT



Work Order #:	98496	Work ID:	REL22-5157
Project Descriptio	<b>on:</b> 72hr Pump test of Bedrock well TW-2-13		
Client:	City of Hamilton	Report To:	Marco Silverio
Profile:	Non-regulated Water Sampling		City of Hamilton 100 King St. West
Sampled By:	Marco Silverio		Level 9
Sample Count:	2		Hamilton, marco.silverio@hamilton.ca

## Authorized by: Sarah Ostler, Acting Laboratory Supervisor

## Workorder Summary

## Workorder Comments

Cryptosporidium and Giardia Internal Control – Percent Recovery: Cryptosporidium, 75%; Giardia, 73%. Microscopic Particulate Analysis - Parameter results have been adjusted to reflect 100L of the original sample volume.

## Analysis Results Comments

9849601 (TW-2-13) - Filtered Volume

Value provided by client.

## Task Comments

#### 9849601 - 4441443 - MBI/69858

The bioindicators Giardia, Cryptosporidium, Diatoms, Other Algae, Rotifers, Insect/Larvae and Plant Debris (Chlorophyll containing), were calculated to have a relative risk factor of 0 (not significant). According to the USEPA Consensus method (1992, EPA910/9-92-029) the relative risk score of surface water contamination is 0 – Low Risk.

## **Analytical Results**

Parameter		Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	С	
Lab ID: Matrix: Type:	9849601 Water Ground Water	Sample ID: Location: Description:	TW-2-13 TW-2-13 Well Crypto/Giardia	<b>Criteria:</b> MPA (48hr)	Cryp )	otospo	oridium & Gi	ardia D Da	ate Received: ate Collected:	12/15/2022 12/14/2022	
CRYPTOSP		DIA (RELM-9)									
Filtered Volum	ne	361	L					12/15/2022	12/17/2022		
Cryptosporidiu	um oocysts	0	n/a	1	1	1	0	12/15/2022	12/17/2022		
Giardia cysts		0	n/a	1	1	1	0	12/15/2022	12/17/2022		
PHYTOPLA	NKTON (RELM-1	5)									
Algae 2-7um		0	n/a		3.3	1		12/19/2022	12/19/2022		
Algae 7-15um	I	0	n/a		3.3	1		12/19/2022	12/19/2022		
Algae >15um		0	n/a		3.3	1		12/19/2022	12/19/2022		
Amoebae		0	n/a		3.3	1		12/19/2022	12/19/2022		
Crustaceans,	Parts	0	n/a		3.3	1		12/19/2022	12/19/2022		
Diatoms		0	n/a		3.3	1		12/19/2022	12/19/2022		
Filtered Volum	ne	361	L					12/19/2022	12/19/2022	*	

Report Date: 12/20/2022 11:10:35 AM

#### Report ID: 98496-4448502

Page 1 of 3

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901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664

## LABORATORY ANALYSIS REPORT



#### Work Order #: 98496

Work ID:

REL22-5157

Parameter		Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
Gastrotrichs		0	n/a		3.3	1		12/19/2022	12/19/2022	
Insects, Parts	3	0	n/a		3.3	1		12/19/2022	12/19/2022	
Invertebrate e	eggs	0	n/a		3.3	1		12/19/2022	12/19/2022	
Nematodes, e	eggs	0	n/a		3.3	1		12/19/2022	12/19/2022	
Pollen		0	n/a		3.3	1		12/19/2022	12/19/2022	
Protozoa		0	n/a		3.3	1		12/19/2022	12/19/2022	
Rotifers, eggs	5	0	n/a		3.3	1		12/19/2022	12/19/2022	
Spores		0	n/a		3.3	1		12/19/2022	12/19/2022	
Tardigrades		0	n/a		3.3	1		12/19/2022	12/19/2022	
Vegetative de	ebris	0	n/a		3.3	1		12/19/2022	12/19/2022	
Lab ID: Matrix: Type:	9849602 Water Ground Water	Sample ID: Location: Description:	TW-2-13 TW-2-13 We F-Coliphage	<b>Criteria:</b> Il 48hr	N/A			Date Date	Received: Collected:	12/15/2022 12/14/2022
COLIPHAG	ES (RELM-16)									
Male-Spec. C DNA+RNA	Coliphage	0	PFU/100mL	1	1	1		12/16/2022	12/17/2022	
Male-Spec. C	Coliphage RNA	0	PFU/100mL	1	1	1		12/16/2022	12/17/2022	

Report Date: 12/20/2022 11:10:35 AM

Report ID: 98496-4448502

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901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664



## LABORATORY ANALYSIS REPORT

## Work Order #: 98496

Work ID:

REL22-5157

	W Maril	Durker	-			_					Page	. 1	of	
York Region	York Regi	Durham ional Environmental Laboratory	R	EI 2	2-515	7		Non-re	aulate	ed ₩	late	r.		
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Fax: 905-686-0664 Er	mail: rel@durham.ca V	Neb: www.durham.ca	L					Chair	of Custo	ody Fr	orm	<i>i</i> 011	2	8
Client Informat	ion T	11 - 01-	Invoice T	O (leave bla	ink if same as	Client)	Rep	ort to (email address)						
Company Name:	City of	Hamillon	Company:				1)	marco - selveric	a la	milt	- ·	28		
Facility Name:	-lamiltion W.	ter- watershed Hanagement					2)	prochole @ t	Inahol	Ne .	ia			
Facility Address:	100 King	ST. West Livel of	Quote #:				3)	1-11-0-	24-1	<u> </u>				
Facility Contact:	Marco 2	ilverio	PO #:				4)							
Email: marco	, reherio(	2 hamellin. Tel: (905) 546 2424 ent. 6	<b>j</b> o99				5)							
Description: 72	Description: 72h / um/ Titt of bedrack well TW-2-13													
Sample(s) Intol	mation	1			/	Collec	tion		Cor	ntainer		Chl	orine	Apply
( lab use only )	Field ID	Location/Description/Comment(s)	)	Matrix	Туре	mm-dd-yy	HH:MM	Test Group(s)	Туре	Sent	Rec'd	Free	Total	Criteria (Y/N) (*1)
0	TW-2-13	TW-2-13 Will - Crypto / Girdie /HP	PA (486)	WA	GW	12 -14-22	15:47	HBCGHPA	Catulze.	1				(1/1/)
02	1-2-13	TW-2-13 Well - F- Colifha	pe (48h	WA	GW	12-14-22	15:50	MBCPF	Bothles	2	2		$\square$	
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Sampled by.		Haves serveres		-	(40) 15 41	6 LYLY in	. 60m	Sanitary Sewer Use By-law						
					a [			Storm Sewer Use By-law						
Relinquished By (	Print/Sign):	MARCO SILVERIO	F	Date/Time:	December	14,2022	<u> </u>	New Water Main						
		4 - SND				17:36	5	Other	Grounder	the v	Nell 1	Zemp	s at	- Joho
LABORATORY U	SEONLY				(ADM) NO	a and the right for the second		lews	1 anth	in	tami	eltin		
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Report Date: 12/20/2022 11:10:35 AM

Report ID: 98496-4448502

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# York Region

## York-Durham Regional Environmental Laboratory

901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664

## LABORATORY ANALYSIS REPORT



Work Order #:	98574	Work ID:	REL22-5159
Project Descriptio	n: 72hr Pump Test of Bedrock Well TW-2-13 City of Hamilton	Report To:	Marco Silverio
Profile:	Non-regulated Water Sampling		City of Hamilton
Sampled By: Sample Count:	Marco Silverio 2		Level 9 Hamilton, marco.silverio@hamilton.ca

## Authorized by: Sarah Ostler, Acting Laboratory Supervisor

## Workorder Summary

## Workorder Comments

Cryptosporidium and Giardia Internal Control – Percent Recovery: Cryptosporidium, 75%; Giardia, 73%. Microscopic Particulate Analysis - Parameter results have been adjusted to reflect 100L of the original sample volume.

## Analysis Results Comments

9857401 (TW-2-13) - Filtered Volume

Value provided by client.

## Task Comments

#### 9857401 - 4443805 - MBI/69858

The bioindicators Giardia, Cryptosporidium, Diatoms, Other Algae, Rotifers, Insect/Larvae and Plant Debris (Chlorophyll containing), were calculated to have a relative risk factor of 0 (not significant). According to the USEPA Consensus method (1992, EPA910/9-92-029) the relative risk score of surface water contamination is 0 – Low Risk.

# Analytical Results

Parameter		Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	С
Lab ID: Matrix: Type:	9857401 Water Ground Water	Sample ID: Location: Description:	TW-2-13 TW-2-13 Well Crypto/Giardia/	<b>Criteria:</b> MPA 72 hi	Сгур	otosp	oridium & Giar	rdia Da Da	ate Received: ate Collected:	12/16/2022 12/15/2022
CRYPTOSP	ORIDIUM / GIARD	IA (RELM-9)								
Filtered Volum	ne	317	L					12/16/2022	12/17/2022	
Cryptosporidiu	um oocysts	0	n/a	1	1	1	0	12/16/2022	12/17/2022	
Giardia cysts		0	n/a	1	1	1	0	12/16/2022	12/17/2022	
PHYTOPLA	NKTON (RELM-15	5)								
Algae 2-7um		0	n/a		3.8	1		12/19/2022	12/19/2022	
Algae 7-15um	I	0	n/a		3.8	1		12/19/2022	12/19/2022	
Algae >15um		0	n/a		3.8	1		12/19/2022	12/19/2022	
Amoebae		0	n/a		3.8	1		12/19/2022	12/19/2022	
Crustaceans,	Parts	0	n/a		3.8	1		12/19/2022	12/19/2022	
Diatoms		0	n/a		3.8	1		12/19/2022	12/19/2022	
Filtered Volum	ne	317	L					12/19/2022	12/19/2022	*

Report Date: 12/20/2022 11:10:36 AM

#### Report ID: 98574-4448497

Page 1 of 3

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901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664

## LABORATORY ANALYSIS REPORT



## Work Order #: 98574

Work ID:

REL22-5159

## Analytical Results

Parameter		Results	Units	MDL	RDL	DF	Limit	Prepared	Analyzed	C
Gastrotrichs		0	n/a		3.8	1		12/19/2022	12/19/2022	
Insects, Parts	3	0	n/a		3.8	1		12/19/2022	12/19/2022	
Invertebrate e	eggs	0	n/a		3.8	1		12/19/2022	12/19/2022	
Nematodes, e	eggs	0	n/a		3.8	1		12/19/2022	12/19/2022	
Pollen		0	n/a		3.8	1		12/19/2022	12/19/2022	
Protozoa		0	n/a		3.8	1		12/19/2022	12/19/2022	
Rotifers, eggs	6	0	n/a		3.8	1		12/19/2022	12/19/2022	
Spores		0	n/a		3.8	1		12/19/2022	12/19/2022	
Tardigrades		0	n/a		3.8	1		12/19/2022	12/19/2022	
Vegetative de	ebris	0	n/a		3.8	1		12/19/2022	12/19/2022	
Lab ID: Matrix: Type:	9857402 Water Ground Water	Sample ID: Location: Description:	TW-2-13 TW-2-13 Well F.Coliphage 7	Criteria: 2 hr	N/A			Date   Date (	Received: Collected:	12/16/2022 12/15/2022
COLIPHAG	ES (RELM-16)									
Male-Spec. C DNA+RNA	Coliphage	0	PFU/100mL	1	1	1		12/16/2022	12/17/2022	
Male-Spec. C	oliphage RNA	0	PFU/100mL	1	1	1		12/16/2022	12/17/2022	

Report Date: 12/20/2022 11:10:36 AM

Report ID: 98574-4448497

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901 McKay Road Pickering, ON L1W 3A3 Phone (905)686-0041 Fax (905)686-0664



## LABORATORY ANALYSIS REPORT

## Work Order #: 98574

Work ID:

REL22-5159

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901 McKay Road, Pic	kering ON L1W 3A3 T	oll Free: 1-877-551-8877 Local: 905-686-0041			-010	5		Wastew	ater.Bi	oso	lid.S	ioil	Q	NV-
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Description: 724	fun (11 applicable)	Judick well TW-2-13	Standard T	furnaround T	Jime (TAT) is 10	) business days	*RUSH	*Rush TAT requires lab ap	pproval in advr	ance. Su	urcharge	will appl	ıy.	
Lab ID	mation (	1		T		Collec	ction	I	Cor	ntainer		Chic	rine	Apply
(lab use only)	Field ID	Location/Description/Comment(s)	Ĺ′	Matrix	Туре	mm-dd-yy	HH:MM	Test Group(s)	Туре	Sent	Rec'd	Free	Total	(Y/N) (*1)
0)	TW-2-13	tw-2-13 Well - Cigito / Gundia / HPA	(7zh)	WA	GW	12-15-22	16:43	MBCG MPA	Cartridge	1	1			
02	1-2-13	twizers well . F. Williage ("	724)	WA	GW	12-15-22	16.36	MBCPF	B.HO.	2	2			
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		. 9.2 1					(1) Se	elect One Applicable Criteri	ia Provi	de Munic	cipality /	City / De	scriptior	
Sampled By:		Jano Liberio		- Tel:	(905) 546	,-2424 st.	. 6099 🗆	Sanitary Sewer Use By-law						
								Storm Sewer Use By-law						
Relinquished By (	Print/Sign):	MARCO SILVERIO		Date/Time:	December	15,2022		New Water Main						
		Ma due		25	1	8:22	Ø	Other	Convendu	ater 1	well	Punt	tet	T at
LABORATORY U	SE ONLY							Jak	man Te	20 7	ark i	m He	miet	- Lo
Delivery Method:	Courie	r Drop Off 🛛 YDREL Pickup 🗌					ed Da	ate/Time:					<u></u>	
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REL-COC-NONREG	3-NOV-2019-REV-1							lemp 16.	b C					

Report Date: 12/20/2022 11:10:36 AM

Report ID: 98574-4448497

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<b>B</b> 1 11 11		Î
Construction Materials Engineering	, Inspection & Testing	
Consulting Geotechnical & Environ	mental Engineering	

Project:	Johnson Tew Park, Hamilton	Water Level:	11.52 Well Dia:	150 mm
File/Report No:	7-22-0561-54	Well Depth:	21.84 Screen Length:	Open
Date/Time:	10/13/2022	Stick Up:	1.01 Water Temp:	
Inspector:	HP	Weather:	10 Well No:	TW-2-13

Time	Elapsed Time (sec)	Depth to Water Level (mbgl)	Drawdown (m)	Comments
10/13/2022 10:15	0	11.52	0.00	50 L/min
	30	11.70	0.18	Pump Test
	60	11.70	0.18	
	90	11.73	0.21	
	120	11.73	0.21	
	150	11.73	0.21	
	180	11.73	0.21	
	210	11.73	0.21	
	240	11.73	0.21	
	270	11.75	0.23	
	300	11.75	0.23	
	420	11.77	0.25	
	600	11.77	0.25	
	900	11.77	0.25	
	1800	11.79	0.27	
	2700	11.82	0.30	
60 mins	3600	11.80	0.28	
			1	
				-





Construction Materials Engineering, Inspection & Testing	Consulting Geotechnical & Environ	mental Engineering	
	Construction Materials Engineering,	, Inspection & Testing	
			-

Project:	Johnson Tew Park, Hamilton	Water Level:	11.52 Well Dia:	150 mm
File/Report No:	7-22-0561-54	Well Depth:	21.84 Screen Length:	Open
Date/Time:	10/13/2022	Stick Up:	1.01 Water Temp:	
Inspector:	HP	Weather:	10 Well No:	TW-2-13

Time	Elapsed Time (sec)	Depth to Water Level (mbgl)	Drawdown (m)	Comments
10/13/2022 0:00	30	12.04	0.52	70 L/min
	60	12.09	0.57	Pump Test
	90	12.12	0.60	•
	120	12.13	0.61	
	150	12.13	0.61	
	180	12.14	0.62	
	210	12.14	0.62	
	240	12.15	0.63	
	270	12.15	0.63	
	300	12.16	0.64	
	420	12.17	0.65	
	600	12.17	0.65	
	900	12.18	0.66	
	1800	12.19	0.67	
	2700	12.19	0.67	
	3600	12.21	0.69	
00 ·	4500	12.20	0.68	
90 mins	5400	12.21	0.69	





Consulting Geotechnical & Environi	mental Engineering	
Construction Materials Engineering,	Inspection & Testing	
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Project:	Johnson Tew Park, Hamilton	Water Level:	11.52 Well Dia:	150 mm
File/Report No:	7-22-0561-54	Well Depth:	21.84 Screen Length:	Open
Date/Time:	10/13/2022	Stick Up:	1.01 Water Temp:	
Inspector:	HP	Weather:	10 Well No:	TW-2-13

Time	Elapsed Time (sec)	Depth to Water Level (mbgl)	Drawdown (m)	Comments
10/13/2022 0:00	30	12.43	0.91	90 L/min
10/10/2022 0100	60	12.48	0.96	Pump Test
	90	12.48	0.96	·
	120	12 49	0.97	
	150	12 49	0.97	
	180	12.50	0.98	
	210	12.50	0.00	
	240	12.50	0.00	
	270	12.50	0.00	
	300	12.50	0.00	
	420	12.00	0.00	
	600	12.48	0.96	
	900	12.48	0.96	
	1800	12.48	0.96	
	2700	12.40	0.90	
	3600	12.49	0.97	
	4500	12.49	0.97	
	4300 5400	12.49	0.97	
	6200	12.50	0.90	
120 mine	7200	12.50	0.90	
120 111115	7200	12.50	0.90	
1				





Consulting Geotechnical & Environmer	ntal Engineering
Construction Materials Engineering, Ins	spection & Testing

Project:	Johnson Tew Park, Hamilton	Water Level:	11.52 Well Dia:	150 mm
File/Report No:	7-22-0561-54	Well Depth:	21.84 Screen Length:	Open
Date/Time:	10/13/2022	Stick Up:	1.01 Water Temp:	-
Inspector:	HP	Weather:	10 Well No:	

Time		Elapsed Time (sec)	Depth to Water Level (mbgl)	Recovery (m)	% Recovery	
2/28/2020	14:00:00 PM	0	12.5	0	0	
		30	12.22	0.28	29	
		60	12.17	0.33	34	
		90	12.15	0.35	36	
		120	12.13	0.37	38	
		150	12.12	0.38	39	
		180	12.10	0.4	41	
		210	12.09	0.41	42	
		240	12.08	0.42	43	
		270	12.07	0.43	44	
		300	12.06	0.44	45	
		420	12.04	0.46	47	
		600	12.02	0.48	49	
		900	11 99	0.10	52	
		1800	11.00	0.57	53	
		2700	11.96	0.54	55	
		2100	11.00	0.04	00	
L						



# U-50 Series Specifications

	U-51 U-52 U-52G U-53 U-53G U-54					U-54G				
	Measurement temperature			-10 to 55℃						
	Maximum sensor diameter			Approx. 96 mm						
	Probe length	Approx. 340 mm								
	Cable length		5	Standard: 2 m, option: 10, 30	m					
Sensor Probe	Mass		Approx. 1,800 g (Approx. 3.97 lbs)							
	Automatic calibration (uses pH4)	•		•			•			
	Nossurement denth		_	Max 30 m	•	•	_	_		
	liquid contact part material (liquid end material)		PPS glass SUS316L S	US304 FKM PEEK O titaniun	n FEP membrane POM					
	Water resistance		JIS protection level 8							
	Outer dimensions			115 (W) x 66 (D) x 283 (H) mr	n					
	Mass		A	Approx. 800 g (Approx. 1.76 lk	os)					
	LCD		320 x 240 liquid	crystal display with backlight	(black and white)					
	Data memory			10,000						
Control Unit	Communication			USB Chattaniaan A						
	Water resistance		IIS protec	tion level 7 (when sensor cal	le is fitted)					
	Battery Life	ady	rox. 70 hours (without back	klight)	Approx, 500 r	neasurements	Approx, 70 hours	without backlight)		
	Storage temperature			-10 to 60°C						
	Ambient temperature			-5 to 45℃						
	Measurement principle			Glass electrode method						
pH	Range			pH0 to 14						
<ul> <li>I wo-point calibration</li> <li>Automatic temperature</li> </ul>	Resolution			0.01pH						
	Repeatability			±0.05pH						
	Accuracy Measurement principle			±0.1pH Platinum electrode method	1					
Oxidation	Range			-2000 mV to +2000 mV						
Reduction Potential	Resolution			1 mV						
(ORP)	Repeatability			±5 mV						
	Accuracy			±15 mV						
Dissolved Oxygen (DO)	Measurement principle			Polarographic method						
<ul> <li>Salinity conversion</li> </ul>	Range			0 to 50.0 mg/L						
(0 to 70 PPT/automatic)	Resolution			0.01 mg/L						
compensation	Accuracy	0 to 20 mg/L: ±0.2 mg/L 20 to 50 mg/L: ±0.5 mg/L								
	Measurement principle		0 to 20 mg	4 AC electrode method	,					
Conductivity (COND)	Range	0 to 10 S/m (0 to 100 mS/cm)								
•Auto range	Resolution	0.000 to 0.999 mS/cm: 0.001 mS/cm 1.00 to 9.99 mS/cm: 0.01 mS/cm 10.0 to 99.9 mS/cm: 0.1 mS/cm								
•Automatic temperature $(25^{\circ})$		0.0 to 99.9 mS/m: 0.1 mS/m 0.100 to 0.999 S/m: 0.001 S/m 1.00 to 9.99 S/m: 0.01 S/m								
	Repeatability	±0.05% F.S.								
	Accuracy Measurement principle		"±1%)r	Conductivity conversion						
	Range			0 to 70 PPT (permillage)						
Salinity	Resolution			0.1 PPT						
	Repeatability			±1 PPT						
	Accuracy			±3 PPT						
Total Dissolved Solid	Measurement principle			Conductivity conversion						
(TDS)	Range			0 to 100 g/L						
•Conversion factor setting	Repeatability			+2 a/l						
	Accuracy			±5 g/L						
	Measurement principle			Conductivity conversion						
Seawater specific	Range			0 to 50 <i>O</i> t						
gravity	Resolution			0.1 <i>O</i> t						
•Display O t, O 0, O 15	Repeatability			±2 <i>0</i> t						
	Accuracy Measurement principle			±50 t Thermistor method						
	Range			-10 to 55℃						
Temperature	Resolution			0.01℃						
	Repeatability			*±0.10°C (at calibration poin	t)					
	Accuracy		JIS class B plat	tinum thermometer sensor (	±0.3+0.005   t  )					
	Measurement principle		LED light source and	30° scattering method	Tungsten lamp source a	nd 90° scattering method	LED light source and	90° scattering method		
	Kange		0 to 8	300 N I U	0 to 10		0 to 10			
	Resolution		0 to 99.9 NTU: 0.1 NTU	100 to 800 NTU: 1 NTU	100 to 1000	) NTU: 1 NTU	100 to 1000	NTU: 1 NTU		
Turbidity (TURB)	Repeatability	_	*±5% (Reading) or ± 0.5	NTU whichever is greater	±3% (Reading) or ±0.1 M 0 to 10 NT	NTU whichever is greater U: ±0.5 NTU	±5% (Reading) or ± 0.5 M	ITU whichever is greater		
	Accuracy		±5% (Reading) or ±1 N	ITU whichever is greater	10 to 1000 NT or ±1 NTU whic	J: 3% (Reading) chever is greater	±5% (Reading) or ±1 N	۲U whichever is greater		
	Measurement principle Range				Pressure method 0 to 30 m	-	Pressure method, only	10m and 30m product		
Water depth	Resolution	—	—		0.05 m					
	Repeatability				±1% F.S.					
	Accuracy				±0.3 m					
GPS	12 channel parallel	—	-		_		-	•		

Note: \* Battery life based on continuous operation using alkaline C dry batteries when the monitor temperature is over 20°C and the backlight OFF. \* Accuracy is measured by calibrating 4 points for turbidity and electrical conductivity and 2 points for all other measurements against standard solution. \* Repeatability is measured by the ability to reproduce the results against the standard solution (at 25°C normal pressure condition).



Project: Pump Test TW-2-13

#### ISO# 2023013 Location: C2 3 for 18O, 2H

1.83 2.00 1.12

#	Sample	Date	Lab#	$\delta^{18}O$	Result	Repeat	$\delta^2 H$	Result	Repeat		pН	EC
				$H_2O$	VSMOV	V ±0.2‰	$H_2O$	VSMOV	V ± 0.8‰			mS/cm
1	FDG01	15/12/2022 (9:40)	495544	Х	-10.25	-10.14	Х	-67.21	-67.44	100mlx2	7.16	1.83
2	Surface Water	15/12/2022 (10:10)	495545	Х	-8.61		Х	-59.09		100mlx2	7.51	2.00
3	TW-2-13	15/12/2022 (16:35)	495546	Х	-10.30	-10.27	Х	-67.69	-67.90	100mlx2	7.22	1.12

AZD



Silverio 2023013

-10.25	-10.14	-67.21	-67.44
-8.61		-59.09	
-10.30	-10.27	-67.69	-67.90

-14 -230

-3.00 -30.00





#### WELL ID: Greensville TW 2-13 - Drawdown Local ID: Greensville, Hamilton, Ontario INPUT Date: ######### Construction: Time: 0:00 Casing dia. (d<sub>c</sub>) 0.15 Meter Annulus dia. (d<sub>w</sub>) 0.15 Meter COMPUTED Screen Length (L) 8.84 Meter Depths to: Aquifer thickness = 9.4 Meter water level (DTW) 10.85 Meter Top of Aquifer 11.9 Meter 0.038114 Meter/log10 Slope = Base of Aquifer 21.3 Meter Input is consistent. Annular Fill: across screen -- Open Hole 0.00023 Meter/Second above screen -- Bentonite K = 0.0022 Meter<sup>2</sup>/Second T = Aquifer Material -- Reef Limestone 90 liters/min FLOW RATE



Pumping\_Cooper-Jacob (Drawdown)

	Reduced Data				
	Time,	Water Level		Time,	Water Level
Entry	Date Hr:Min:Sec	Meter	Entry	Date Hr:Min:Sec	Meter
1	1/0/00 0:00:00	232.90	51	1/1/00 9:20:00	231.93
2	1/0/00 0:40:00	232.05	52	1/1/00 10:00:00	231.93
З	1/0/00 1.20.00	232.02	53	1/1/00 10:40:00	231.03
0	1/0/00 1.20.00	202.02	55	1/1/00 10.40.00	201.00
4	1/0/00 2:00:00	232.00	54	1/1/00 11:20:00	231.93
5	1/0/00 2:40:00	231.97	55	1/1/00 12:00:00	231.93
0 7	1/0/00 3:20:00	231.95	50 57	1/1/00 12:40:00	231.93
/ Q	1/0/00 4.00.00	231.94	57 58	1/1/00 13.20.00	231.91
0	1/0/00 4.40.00	201.94	50	1/1/00 14:00:00	201.90
9	1/0/00 5:20:00	231.95	59	1/1/00 14:40:00	231.90
10	1/0/00 6:00:00	231.91	60	1/1/00 15:20:00	231.89
11	1/0/00 6:40:00	231.95	61	1/1/00 16:00:00	231.91
12	1/0/00 7:20:00	231.96	62	1/1/00 16:40:00	231.91
13	1/0/00 8:00:00	231.95	63	1/1/00 17:20:00	231.90
14	1/0/00 8:40:00	231.95	64	1/1/00 18:00:00	231.91
15	1/0/00 9:20:00	231.94	65	1/1/00 18:40:00	231.90
16	1/0/00 10:00:00	231.96	66	1/1/00 19:20:00	231.90
17	1/0/00 10:40:00	231.96	67	1/1/00 20:00:00	231.88
18	1/0/00 11:20:00	231.96	68	1/1/00 20:40:00	231.89
19	1/0/00 12:00:00	231.96	69	1/1/00 21:20:00	231.89
20	1/0/00 12:40:00	231.96	70	1/1/00 22:00:00	231.90
21	1/0/00 13:20:00	231.95	71	1/1/00 22:40:00	231.90
22	1/0/00 14:00:00	231.94	72	1/1/00 23:20:00	231.90
23	1/0/00 14:40:00	231.93	73	1/2/00 0:00:00	231.91
24	1/0/00 15:20:00	231.93	74	1/2/00 0:40:00	231.90
25	1/0/00 16:00:00	231.94	75	1/2/00 1:20:00	231.91
26	1/0/00 16:40:00	231.93	76 77	1/2/00 2:00:00	231.88
27	1/0/00 17:20:00	231.92	11	1/2/00 2:40:00	231.87
28	1/0/00 18:00:00	231.93	78	1/2/00 3:20:00	231.88
29	1/0/00 18:40:00	231.88	79	1/2/00 4:00:00	231.86
30	1/0/00 19:20:00	231.91	80	1/2/00 4:40:00	231.85
31	1/0/00 20:00:00	231.91	81	1/2/00 5:20:00	231.89
3Z 22	1/0/00 20:40:00	231.92	82	1/2/00 6:00:00	231.90
30	1/0/00 21.20.00	231.92	84	1/2/00 0.40.00	231.91
35	1/0/00 22:00:00	231.92	85	1/2/00 8:00:00	231.91
36	1/0/00 23:20:00	231.91	86	1/2/00 8:40:00	231.93
37	1/1/00 0:00:00	231.93	87	1/2/00 9:20:00	231.92
38	1/1/00 0:40:00	231.92	88	1/2/00 10:00:00	231.91
39	1/1/00 1:20:00	231.92	89	1/2/00 10:40:00	231.92
40	1/1/00 2:00:00	231.91	90	1/2/00 11:20:00	231.92
41	1/1/00 2:40:00	231.91	91	1/2/00 12:00:00	231.92
42	1/1/00 3:20:00	231.92	92	1/2/00 12:40:00	231.93
43	1/1/00 4:00:00	231.90	93	1/2/00 13:20:00	231.92
44	1/1/00 4:40:00	231.92	94	1/2/00 14:00:00	231.91
45	1/1/00 5:20:00	231.93	95	1/2/00 14:40:00	231.91
46	1/1/00 6:00:00	231.93	96	1/2/00 15:20:00	231.91
47	1/1/00 6:40:00	231.93	97	1/2/00 16:00:00	231.90
48	1/1/00 7:20:00	231.93	98	1/2/00 16:40:00	231.90
49 50	1/1/00 8:00:00	231.93	99	1/2/00 17:20:00	231.90
50	1/1/00 8:40:00	231.93	100	1/2/00 10:00:00	∠31.90

	WELL ID:	Greensville TVV 2-13 - Recovery				
		Local ID: Greensville, Hamilton, Ontario				
IN	IPUT		Date:	########		
Construction:			Time: (	0:00		
Casing dia. (d <sub>c</sub> )	0.15 Meter					
Annulus dia. (d <sub>w</sub> )	0.15 Meter		C	OMPUTED		
Screen Length (L)	8.84 Meter	-				
Depths to:		Aquifer	thickness =	9.4 Meter		
water level (DTW)	10.58 Meter					
Top of Aquifer	11.9 Meter		Slope =	0.039046 Meter/log10		
Base of Aquifer	21.3 Meter	_				
Annular Fill:			Input	t is consistent.		
across screen O	pen Hole					
above screen Be		K =	0.00023 Meter/Second			
Aquifer Material Re	eef Limestone		T =	0.0021 Meter <sup>2</sup> /Second		
FLOW RATE	90 liters/min					



Pumping\_Cooper-Jacob (TW 2-13 Recovery)

	Reduced Data				
	Time,	Water Level		Time,	Water Level
Entrv	Date Hr:Min:Sec	Meter	Entry	Date Hr:Min:Sec	Meter
1	1/0/00 0.00.00	231.88	51	1/1/00 9.20.00	232 88
2	1/0/00 0:40:00	232.67	52	1/1/00 10:00:00	232.88
2	1/0/00 0.40.00	202.01	52	1/1/00 10.00.00	202.00
3	1/0/00 1:20:00	232.72	53	1/1/00 10:40:00	232.88
4	1/0/00 2:00:00	232.73	54	1/1/00 11:20:00	232.89
5	1/0/00 2:40:00	232.77	55	1/1/00 12:00:00	232.90
6	1/0/00 3:20:00	232.78	56	1/1/00 12:40:00	232.90
7	1/0/00 4:00:00	232.77	57	1/1/00 13:20:00	232.90
8	1/0/00 4:40:00	232.79	58	1/1/00 14:00:00	232.89
9	1/0/00 5:20:00	232.80	59	1/1/00 14:40:00	232.88
10	1/0/00 6:00:00	232.82	60	1/1/00 15:20:00	232.89
11	1/0/00 6:40:00	232.82	61	1/1/00 16:00:00	232.87
12	1/0/00 7:20:00	232.83	62	1/1/00 16:40:00	232.88
13	1/0/00 8:00:00	232.84	63	1/1/00 17:20:00	232.87
14	1/0/00 8:40:00	232.83	64	1/1/00 18:00:00	232.86
15	1/0/00 9.20.00	232 79	65	1/1/00 18:40:00	232 87
16	1/0/00 10:00:00	232.82	66	1/1/00 19:20:00	232.86
17	1/0/00 10:40:00	232.84	67	1/1/00 20:00:00	232.88
18	1/0/00 11:20:00	232.85	68	1/1/00 20:40:00	232.88
19	1/0/00 12:00:00	232.86	69	1/1/00 21:20:00	232.80
20	1/0/00 12:40:00	232.85	70	1/1/00 22:00:00	232.84
21	1/0/00 13:20:00	232.81	71	1/1/00 22:40:00	232.86
22	1/0/00 14:00:00	232.84	72	1/1/00 23:20:00	232.88
23	1/0/00 14:40:00	232.85	73	1/2/00 0:00:00	232.89
24	1/0/00 15:20:00	232.84	74	1/2/00 0:40:00	232.88
25	1/0/00 16:00:00	232.85	75	1/2/00 1:20:00	232.88
26	1/0/00 16:40:00	232.85	76	1/2/00 2:00:00	232.88
27	1/0/00 17:20:00	232.85	77	1/2/00 2:40:00	232.86
28	1/0/00 18:00:00	232.86	78	1/2/00 3.20.00	232.88
20	1/0/00 18:40:00	232.00	70	1/2/00 3:20:00	232.00
30	1/0/00 10:40:00	232.04	80	1/2/00 4:40:00	232.88
31	1/0/00 20:00:00	232.00	81	1/2/00 4:40:00	232.88
32	1/0/00 20:00:00	232.86	82	1/2/00 6:00:00	232.88
33	1/0/00 20:40:00	232.80	83	1/2/00 6:40:00	232.80
34	1/0/00 22:00:00	232.87	84	1/2/00 7:20:00	232.00
35	1/0/00 22:00:00	232.87	85	1/2/00 8:00:00	232.00
36	1/0/00 23:20:00	232.86	86	1/2/00 8:40:00	232.89
37	1/1/00 0:00:00	232.87	87	1/2/00 9:20:00	232.87
38	1/1/00 0:40:00	232.87	88	1/2/00 10:00:00	232.85
39	1/1/00 1:20:00	232.84	89	1/2/00 10:40:00	232.87
40	1/1/00 2:00:00	232.86	90	1/2/00 11:20:00	232.89
41	1/1/00 2:40:00	232.87	91	1/2/00 12:00:00	232.89
42	1/1/00 3:20:00	232.87	92	1/2/00 12:40:00	232.90
43	1/1/00 4:00:00	232.84	93	1/2/00 13:20:00	232.88
44	1/1/00 4:40:00	232.86	94	1/2/00 14:00:00	232.89
45	1/1/00 5:20:00	232.86	95	1/2/00 14:40:00	232.88
46	1/1/00 6:00:00	232.87	96	1/2/00 15:20:00	232.89
47	1/1/00 6:40:00	232.86	97	1/2/00 16:00:00	232.85
48	1/1/00 7:20:00	232.88	98	1/2/00 16:40:00	232.85
49	1/1/00 8:00:00	232.89	99	1/2/00 17:20:00	232.86
50	1/1/00 8:40:00	232.89	100	1/2/00 18:00:00	232.87

	WELL ID:	Greensville TVV T-T3 - Recovery				
		Local ID: Greensville, Hamilton, Ontario				
IN	IPUT	Date: ########				
Construction:		Time:	0:00			
Casing dia. (d <sub>c</sub> )	0.15 Meter					
Annulus dia. (d <sub>w</sub> )	0.15 Meter	C	OMPUTED			
Screen Length (L)	8.84 Meter					
Depths to:		Aquifer thickness =	9.5 Meter			
water level (DTW)	14.8 Meter					
Top of Aquifer	11.9 Meter	Slope =	0.067191 Meter/log10			
Base of Aquifer	24.3 Meter					
Annular Fill:		Inpu	t is consistent.			
across screen Op	oen Hole					
above screen Bentonite		K =	0.00013 Meter/Second			
Aquifer Material Re	ef Limestone	T =	0.0012 Meter <sup>2</sup> /Second			
FLOW RATE	90 liters/min					



Pumping\_Cooper-Jacob (TW 1-13 Recovery)

	Reduced Data				
	Time,	Water Level		Time,	Water Level
Entry	Date Hr:Min:Sec	Meter	Entry	Date Hr:Min:Sec	Meter
1	1/0/00 0:00:00	233.75	51	1/1/00 9:20:00	234.18
2	1/0/00 0:40:00	233.87	52	1/1/00 10:00:00	234.19
3	1/0/00 1.20.00	233.90	53	1/1/00 10:40:00	234 20
4	1/0/00 2:00:00	200.00	50	1/1/00 11:10:00	201.20
4	1/0/00 2:00:00	233.95	54	1/1/00 11:20:00	234.21
с С	1/0/00 2:40:00	200.90	55 56	1/1/00 12:00:00	204.21
7	1/0/00 3.20.00	233.99	57	1/1/00 12:40:00	234.22
8	1/0/00 4:00:00	234.00	58	1/1/00 13:20:00	234.21
0	1/0/00 4.40.00	204.02	00	1/1/00 14:00:00	204.20
9	1/0/00 5:20:00	234.03	59	1/1/00 14:40:00	234.21
10	1/0/00 6:00:00	234.04	60	1/1/00 15:20:00	234.21
11	1/0/00 6:40:00	234.05	61	1/1/00 16:00:00	234.21
12	1/0/00 7:20:00	234.06	62	1/1/00 16:40:00	234.21
13	1/0/00 8:00:00	234.06	63	1/1/00 17:20:00	234.22
14	1/0/00 8:40:00	234.06	64	1/1/00 18:00:00	234.22
15	1/0/00 9:20:00	234.06	65	1/1/00 18:40:00	234.22
16	1/0/00 10:00:00	234.07	66	1/1/00 19:20:00	234.23
17	1/0/00 10:40:00	234.08	67	1/1/00 20:00:00	234.22
18	1/0/00 11:20:00	234.09	68	1/1/00 20:40:00	234.23
19	1/0/00 12:00:00	234.09	69	1/1/00 21:20:00	234.20
20	1/0/00 12:40:00	234.07	70	1/1/00 22:00:00	234.20
21	1/0/00 13:20:00	234.06	71	1/1/00 22:40:00	234.22
22	1/0/00 14:00:00	234.08	72	1/1/00 23:20:00	234.22
23	1/0/00 14:40:00	234.08	73	1/2/00 0:00:00	234.23
24	1/0/00 15:20:00	234.09	74	1/2/00 0:40:00	234.24
25	1/0/00 16:00:00	234.09	75	1/2/00 1:20:00	234.24
26	1/0/00 16:40:00	234.10	76	1/2/00 2:00:00	234.24
27	1/0/00 17:20:00	234.11	11	1/2/00 2:40:00	234.24
28	1/0/00 18:00:00	234.11	78	1/2/00 3:20:00	234.25
29	1/0/00 18:40:00	234.11	79	1/2/00 4:00:00	234.25
30	1/0/00 19:20:00	234.12	80	1/2/00 4:40:00	234.26
31	1/0/00 20:00:00	234.12	81	1/2/00 5:20:00	234.26
32	1/0/00 20:40:00	234.13	82	1/2/00 6:00:00	234.26
33	1/0/00 21:20:00	234.13	83	1/2/00 6:40:00	234.27
34	1/0/00 22:00:00	234.13	84	1/2/00 7:20:00	234.28
35 26	1/0/00 22:40:00	234.14	85	1/2/00 8:00:00	234.28
27	1/1/00 23.20.00	234.12	00 97	1/2/00 0.40.00	234.20
38	1/1/00 0:00:00	234.14	88	1/2/00 9.20.00	234.20
30	1/1/00 0.40.00	234.13	80	1/2/00 10:00:00	234.27
40	1/1/00 2:00:00	234.15	90	1/2/00 10:40:00	234.20
41	1/1/00 2:40:00	234.15	91	1/2/00 12:00:00	234.20
42	1/1/00 3:20:00	234 11	92	1/2/00 12:00:00	234 27
43	1/1/00 4:00:00	234.12	93	1/2/00 13:20:00	234.28
44	1/1/00 4:40:00	234.14	94	1/2/00 14:00:00	234.27
45	1/1/00 5:20:00	234.14	95	1/2/00 14:40:00	234.28
46	1/1/00 6:00:00	234.15	96	1/2/00 15:20:00	234.27
47	1/1/00 6:40:00	234.17	97	1/2/00 16:00:00	234.27
48	1/1/00 7:20:00	234.18	98	1/2/00 16:40:00	234.27
49	1/1/00 8:00:00	234.18	99	1/2/00 17:20:00	234.26
50	1/1/00 8:40:00	234.18	100	1/2/00 18:00:00	234.27

#### WELL ID: Greensville TW 3-13 - Drawdown Local ID: Greensville, Hamilton, Ontario INPUT Date: ######### Construction: Time: 0:00 Casing dia. (d<sub>c</sub>) 0.15 Meter Annulus dia. (d<sub>w</sub>) COMPUTED 0.15 Meter Screen Length (L) 8.84 Meter Depths to: Aquifer thickness = 14 Meter water level (DTW) 12.6 Meter Top of Aquifer 11.9 Meter Slope = 0.036932 Meter/log10 Base of Aquifer 26.3 Meter Input is consistent. Annular Fill: across screen -- Open Hole above screen -- Bentonite 0.00017 Meter/Second K = Aquifer Material -- Reef Limestone T = 0.0023 Meter<sup>2</sup>/Second FLOW RATE 90 liters/min



Pumping\_Cooper-Jacob (TW 3-13 Drawdown)

	Reduced Data				
	Time,	Water Level		Time,	Water Level
Entrv	Date Hr:Min:Sec	Meter	Entry	Date Hr:Min:Sec	Meter
1	1/0/00 0.00.00	232 49	51	1/1/00 9.20.00	232 28
2	1/0/00 0:40:00	232.16	52	1/1/00 10:00:00	232.31
2	1/0/00 0.40.00	202.40	52	1/1/00 10:00:00	202.01
3	1/0/00 1:20:00	232.43	53	1/1/00 10:40:00	232.30
4	1/0/00 2:00:00	232.42	54	1/1/00 11:20:00	232.30
5	1/0/00 2:40:00	232.41	55	1/1/00 12:00:00	232.31
6	1/0/00 3:20:00	232.39	56	1/1/00 12:40:00	232.30
7	1/0/00 4:00:00	232.37	57	1/1/00 13:20:00	232.29
8	1/0/00 4:40:00	232.38	58	1/1/00 14:00:00	232.28
9	1/0/00 5:20:00	232.37	59	1/1/00 14:40:00	232.29
10	1/0/00 6:00:00	232.36	60	1/1/00 15:20:00	232.29
11	1/0/00 6:40:00	232.36	61	1/1/00 16:00:00	232.29
12	1/0/00 7:20:00	232.36	62	1/1/00 16:40:00	232.29
13	1/0/00 8:00:00	232.36	63	1/1/00 17:20:00	232.26
14	1/0/00 8:40:00	232.36	64	1/1/00 18:00:00	232.28
15	1/0/00 9:20:00	232.30	65	1/1/00 18:40:00	232.28
16	1/0/00 10:00:00	232.34	66	1/1/00 10:40:00	232.20
17	1/0/00 10:00:00	232.33	67	1/1/00 19.20.00	232.20
18	1/0/00 10.40.00	232.34	68	1/1/00 20:00:00	232.29
10	1/0/00 12:00:00	232.35	69	1/1/00 20:40:00	232.20
20	1/0/00 12:00:00	232.30	70	1/1/00 22:00:00	232.23
21	1/0/00 13:20:00	232.32	70	1/1/00 22:00:00	232.20
22	1/0/00 14:00:00	232.32	72	1/1/00 23:20:00	232.20
23	1/0/00 14:40:00	232.00	73	1/2/00 0.00.00	232.29
24	1/0/00 15:20:00	232.20	70	1/2/00 0:00:00	232.20
25	1/0/00 16:00:00	232.32	75	1/2/00 1:20:00	232 29
26	1/0/00 16:40:00	232 32	76	1/2/00 2:00:00	232 29
27	1/0/00 17:20:00	232.30	77	1/2/00 2:40:00	232.27
20	1/0/00 19:00:00	222.00	70	1/2/00 2:20:00	222.26
20	1/0/00 18:00:00	202.02	70	1/2/00 3.20.00	232.20
29	1/0/00 10:40:00	202.02	79	1/2/00 4.00.00	232.22
30 21	1/0/00 19.20.00	232.32	80 81	1/2/00 4.40.00	232.23
22	1/0/00 20:00:00	232.32	01	1/2/00 5.20.00	232.21
32	1/0/00 20.40.00	232.32	02	1/2/00 0.00.00	232.20
24	1/0/00 21.20.00	232.32	84	1/2/00 0.40.00	232.20
35	1/0/00 22:00:00	232.32	85	1/2/00 7.20.00	232.29
36	1/0/00 22:40:00	232.29	86	1/2/00 8:40:00	232.20
37	1/1/00 0.00.00	232.23	87	1/2/00 0.40.00	232.20
38	1/1/00 0:00:00	232.31	88	1/2/00 10:00:00	232.30
30 30	1/1/00 0.40.00	232.31	89	1/2/00 10:00:00	232.30
40	1/1/00 2:00:00	232.00	90	1/2/00 11:20:00	232.00
41	1/1/00 2:40:00	232.20	91	1/2/00 12:00:00	232.20
42	1/1/00 3:20:00	232.31	92	1/2/00 12:00:00	232.30
43	1/1/00 4:00:00	232.31	93	1/2/00 13:20:00	232.29
44	1/1/00 4:40:00	232.30	94	1/2/00 14:00:00	232 29
45	1/1/00 5:20:00	232.31	95	1/2/00 14:40:00	232.30
46	1/1/00 6:00:00	232.30	96	1/2/00 15:20:00	232 29
47	1/1/00 6:40:00	232 30	97	1/2/00 16:00:00	232 27
48	1/1/00 7.20.00	232.30	98	1/2/00 16:40:00	232.26
49	1/1/00 8:00:00	232.30	99	1/2/00 17:20:00	232.28
50	1/1/00 8:40:00	232.30	100	1/2/00 18:00:00	232.28
	WELL ID:	63 Tews Lane - F	Recovery		
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		Local ID: Greensville, Hamilton, Ontario			
IN	PUT	Date: ########			
Construction:		Time:	0:00		
Casing dia. (d <sub>c</sub> )	0.15 Meter				
Annulus dia. (d <sub>w</sub> )	0.15 Meter	COMPUTED			
Screen Length (L)	16 Meter				
Depths to:		Aquifer thickness =	14 Meter		
water level (DTW)	14.2 Meter				
Top of Aquifer	11.9 Meter	Slope =	0.057745 Meter/log10		
Base of Aquifer	28 Meter				
Annular Fill:		Inpu	Input is consistent.		
across screen Op	en Hole				
above screen Bentonite		K =	0.00011 Meter/Second		
Aquifer Material Reef Limestone		T =	0.0015 Meter <sup>2</sup> /Second		
FLOW RATE	90 liters/min				



Pumping\_Cooper-Jacob (63 Tews Recovery)

	Reduced Data				
	Time,	Water Level		Time,	Water Level
Entry	Date Hr:Min:Sec	Meter	Entry	Date Hr:Min:Sec	Meter
1	1/0/00 0.00.00	232 45	51	1/0/00 16:40:00	232 84
2	1/0/00 0:20:00	232.58	52	1/0/00 17:00:00	232.90
~	1/0/00 0.20.00	202.00	52	1/0/00 17.00.00	202.00
3	1/0/00 0:40:00	232.64	53	1/0/00 17:20:00	232.91
4	1/0/00 1:00:00	232.65	54	1/0/00 17:40:00	232.90
5	1/0/00 1:20:00	232.72	55	1/0/00 18:00:00	232.92
6	1/0/00 1:40:00	232.75	56	1/0/00 18:20:00	232.87
7	1/0/00 2:00:00	232.75	57	1/0/00 18:40:00	232.87
8	1/0/00 2:20:00	232.77	58	1/0/00 19:00:00	232.90
9	1/0/00 2:40:00	232.79	59	1/0/00 19:20:00	232.91
10	1/0/00 3:00:00	232.80	60	1/0/00 19:40:00	232.91
11	1/0/00 3:20:00	232.81	61	1/0/00 20:00:00	232.93
12	1/0/00 3:40:00	232.82	62	1/0/00 20:20:00	232.92
13	1/0/00 4:00:00	232.80	63	1/0/00 20:40:00	232.92
14	1/0/00 4:20:00	232.78	64	1/0/00 21:00:00	232.93
15	1/0/00 4:40:00	232.81	65	1/0/00 21:20:00	232.93
16	1/0/00 5:00:00	232.83	66	1/0/00 21:40:00	232.93
17	1/0/00 5:20:00	232.84	67	1/0/00 22:00:00	232.93
18	1/0/00 5:40:00	232.86	68	1/0/00 22:20:00	232.91
19	1/0/00 6:00:00	232.86	69	1/0/00 22:40:00	232.85
20	1/0/00 6:20:00	232.87	70	1/0/00 23:00:00	232.92
21	1/0/00 6:40:00	232.87	71	1/0/00 23:20:00	232.93
22	1/0/00 7:00:00	232.87	72	1/0/00 23:40:00	232.79
23	1/0/00 7:20:00	232.88	73	1/1/00 0:00:00	232.91
24	1/0/00 7:40:00	232.89	74	1/1/00 0:20:00	232.92
25	1/0/00 8:00:00	232.89	75	1/1/00 0:40:00	232.93
26	1/0/00 8:20:00	232.87	76	1/1/00 1:00:00	232.89
27	1/0/00 8:40:00	232.88	77	1/1/00 1:20:00	232.78
28	1/0/00 9:00:00	232.89	78	1/1/00 1:40:00	232.91
29	1/0/00 9:20:00	232.86	79	1/1/00 2:00:00	232.91
30	1/0/00 9:40:00	232.86	80	1/1/00 2:20:00	232.90
31	1/0/00 10:00:00	232.88	81	1/1/00 2:40:00	232.93
32	1/0/00 10:20:00	232.87	82	1/1/00 3:00:00	232.88
33	1/0/00 10:40:00	232.90	83	1/1/00 3:20:00	232.91
34	1/0/00 11:00:00	232.90	84	1/1/00 3:40:00	232.91
35	1/0/00 11:20:00	232.90	85	1/1/00 4:00:00	232.74
36	1/0/00 11:40:00	232.91	86	1/1/00 4:20:00	232.63
37	1/0/00 12:00:00	232.91	87	1/1/00 4:40:00	232.88
38	1/0/00 12:20:00	232.91	88	1/1/00 5:00:00	232.88
39	1/0/00 12:40:00	232.91	89	1/1/00 5:20:00	232.90
40	1/0/00 13:00:00	232.92	90	1/1/00 5:40:00	232.85
41	1/0/00 13:20:00	232.66	91	1/1/00 6:00:00	232.79
42	1/0/00 13:40:00	232.49	92	1/1/00 6:20:00	232.89
43	1/0/00 14:00:00	232.47	93	1/1/00 6:40:00	232.91
44	1/0/00 14:20:00	232.80	94	1/1/00 7:00:00	232.93
45	1/0/00 14:40:00	232.85	95	1/1/00 7:20:00	232.93
46	1/0/00 15:00:00	232.89	96	1/1/00 7:40:00	232.94
47	1/0/00 15:20:00	232.89	97	1/1/00 8:00:00	232.95
48	1/0/00 15:40:00	232.90	98	1/1/00 8:20:00	232.93
49	1/0/00 16:00:00	232.89	99	1/1/00 8:40:00	232.94
50	1/0/00 16:20:00	232.88	100	1/1/00 9:00:00	232.94









