



## TECHNICAL MEMORANDUM

**DATE** June 29, 2022

**Project No.** 21451149

**TO** Pamela Whyte  
Parsons

**FROM** Keith Holmes - Golder-WSP

**EMAIL** keith.p.holmes@wsp.com

### FUTURE OTTAWA HOSPITAL SITE – SEWER DISCHARGE RESULTS COMPARISON

At the request of the client, Golder has completed a review of available groundwater quality information from the site of the future Ottawa Hospital against the City of Ottawa Sewer Use Bylaw 2003-514 for both storm sewer and sanitary sewer discharge. The objective of the review was to identify any exceedances that may indicated a concern with respect to groundwater management during construction.

The review included 62 distinct groundwater samples collected from the site between 2016 and 2021. The samples collected were for the purpose of ongoing Phase II Environmental Site Assessments or other specific purposes, none of which were for sewer discharge compliance. As such not all samples included the same analytical packages and none of the samples included total metals analysis which is a requirement for sewer discharge but not for Phase II ESAs which includes dissolved (filtered) metals. As such, metals results may not be representative of final excavation dewatering.

The groundwater results compared to both City of Ottawa sewer discharge criteria is included in the attached table and is summarized below.

When compared to the sanitary/combined sewer discharge criteria the following is noted:

- There were no exceedances of any of the analysed parameters compared to the applicable sanitary/combined sewer discharge criteria.

When compared to the compared to the storm sewer discharge criteria the following is noted:

- The concentration of manganese in several samples including the average of all results was in excess of the storm sewer discharge criteria. The average concentration of manganese was 189 ug/L, compared to the discharge criteria of 50 ug/L. Manganese is known to be naturally elevated regionally.
- With one exception, total suspended solids (TSS) were in excess of the storm sewer criteria with an average concentration of 84 ug/L vs the criteria of 15 ug/L. The TSS is a reflection of the amount of solids in the sample and can be reduced by filtration or settlement. Slightly elevated TSS is most likely due to the method of sample collection from a monitoring well.

- Copper in monitoring well 16-01 within the former John Carling Building exceeded the storm sewer criteria (177 ug/L vs the criteria of 40 ug/L). It is understood that this location has been excavated as part of the ongoing remediation work in that area.
- Toluene in monitoring well 17-10 at the southern limit of the site exceeded the storm sewer criteria (4.1 ug/L vs the criteria of 2 ug/L). Although present at other locations, none exceeded the storm sewer concentration, and the average toluene concentration was less than half of the discharge criteria.

In conclusion there does not appear to be a widespread groundwater quality issues at main hospital site that would prevent sewer discharge, subject to the following.

- A dewatering monitoring program should be implemented to monitor groundwater quality during construction.
- An exemption for the naturally elevated manganese would be required from the City to discharge to storm sewer.
- Total metals analysis would be required to supplement the dissolved metals concentrations completed to date.

We trust the above is sufficient for your current requirements. The conclusions presented herein are based on the data available and included in the attached table. There may be additional data that has been collected by others that is not included in this review. If you have any questions on the above, please contact the undersigned.

**Golder Associates Ltd.**



Keith Holmes, P.Geo.  
*Senior Geoscientist*

KPH/sg  
[https://golderassociates.sharepoint.com/sites/140130/project files/6 deliverables/01 - environmental/21451149-tech memo sewer discharge.docx](https://golderassociates.sharepoint.com/sites/140130/project%20files/6%20deliverables/01%20-%20environmental/21451149-tech%20memo%20sewer%20discharge.docx)

Attachments Groundwater Quality Results – Sewer Use Discharge Comparison, Ottawa Hospital Site

## Groundwater Quality Results – Sewer Use Discharge Comparison, Ottawa Hospital Site

SAMPLE_NAME			21-213	21-218	21-218	DUP-1	MW21-219	21-221S	BH21-222D	BH21-222S	DUP-2	21-224	21-225	21-226	BH1 GW1	BH10 GW1	BH2 GW1	
CHEMICAL_NAME	Ottawa Sewer Use - Sanitary <sup>1</sup>	Ottawa Sewer Use - Storm <sup>1</sup>	UNITS	SAMPLEDATE	07 Jun 2021	09 Jun 2021	25 May 2021	25 May 2021	02 Jun 2021	25 May 2021	25 May 2021	25 May 2021	24 May 2021	25 May 2021	08 Aug 2017	09 Aug 2017	09 Aug 2017	
<b>Ottawa-General Chem</b>																		
Fluoride	10	-	mg/L															
Sulfide	2	-	mg/L															
Sulphate	1500	-	mg/L															
Total Suspended Solids	350	15	mg/L															
<b>Ottawa-Metals</b>																		
Aluminum	50000	-	ug/L															
Antimony	5000	-	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		
Arsenic	1000	20	ug/L	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.3	< 1.0	< 1.0			
Bismuth	5000	-	ug/L															
Boron	25000	-	ug/L	20.4	84.3	96	47.2	46.6	48.7	39.2	< 10.0	< 10.0	116	61.3	87.8			
Cadmium	20	8	ug/L	< 0.20	< 0.20	0.25	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20		
Chromium	5000	80	ug/L	< 2.0	< 2.0	25.8	< 2.0	< 2.0	< 2.0	< 2.0	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		
Cobalt	5000	-	ug/L	< 0.50	0.86	1.99	1.31	0.91	< 0.50	< 0.50	1.67	2.3	< 0.50	3	1.09			
Copper	3000	40	ug/L	< 1.0	2.8	8.6	1.2	2	1.8	< 1.0	34.8	30.5	2.2	1.1	1.1			
Lead	5000	120	ug/L	< 0.50	< 0.50	49.8	< 0.50	< 0.50	< 0.50	< 0.50	1.15	1.05	< 0.50	< 0.50	0.76			
Manganese	5000	50	ug/L															
Mercury	1	0.4	ug/L	< 0.02		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02		
Molybdenum	5000	-	ug/L	< 0.50	3.2	3.01	17.4	14.8	2.89	1.77	15.3	12.5	7.1	7.75	5.84			
Nickel	3000	80	ug/L	< 3.0	< 3.0	< 3.0	4.3	3.1	< 3.0	< 3.0	11.8	9.5	< 3.0	8.8	5.1			
Selenium	5000	20	ug/L	1.8	< 1.0	1.9	1.7	< 1.0	< 1.0	1.1	< 1.0	1.4	< 1.0	3.1	2			
Silver	5000	120	ug/L	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20			
Tin	5000	-	ug/L															
Titanium	5000	-	ug/L															
Vanadium	5000	-	ug/L	< 0.40	1.33	1.28	1	0.62	< 0.40	0.77	0.41	0.5	< 0.40	0.74	1.85			
Zinc	3000	40	ug/L	< 5.0	< 5.0	18.2	7.1	< 5.0	< 5.0	< 5.0	6.3	5.9	< 5.0	< 5.0	13.7			
<b>Ottawa-PCBs</b>																		
Aroclors (PCBs), Total	-	0.4	ug/L					< 0.1	< 0.1	< 0.1								
<b>Ottawa-PHC</b>																		
Benzene	10	2	ug/L	< 0.20		< 0.20	< 0.20	< 0.20	0.6	< 0.20	< 0.40	< 0.40	< 0.20	< 0.20	< 0.20	< 0.5	< 0.5	
Ethylbenzene	57	2	ug/L	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.10	< 0.10	< 0.10	< 0.5	< 0.5	
Petroleum Hydrocarbons - F1 (C6-C10)				< 25		< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	< 25	
Petroleum Hydrocarbons - F2 (C10-C16)				500	500	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
Petroleum Hydrocarbons - F3 (C16-C34)						< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
Petroleum Hydrocarbons - F4 (C34-C50)						< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	
Toluene	80	2	ug/L	0		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.93	< 0.40	< 0.20	< 0.20	< 0.20	< 0.5	< 0.5	
Xylenes, Total	320	4.4	ug/L	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.40	< 0.40	< 0.20	< 0.20	< 0.5	< 0.5	< 0.5	
<b>Ottawa-Phenols</b>																		
2,4-Dichlorophenol	44.0	-	ug/L															
<b>Ottawa-Semi-VOCs</b>																		
1-MethylNaphthalene	32	-	ug/L												< 0.05	< 0.05	< 0.05	
2-MethylNaphthalene	22	-	ug/L												< 0.05	< 0.05	< 0.05	
Fluorene	59	0.04	ug/L	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.05	< 0.05	< 0.05	
Hexachlorobenzene	0.1	-	ug/L															
Naphthalene	59	6.4	ug/L	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.22	< 0.20	< 0.20	< 0.20	< 0.05	< 0.05	< 0.05	
Styrene	40	-	ug/L	< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.10	< 0.10	< 0.10			
Tetryl	-	-	ug/L															
<b>Ottawa-VOCs</b>																		
1,1,1-Trichloroethane	54	-	ug/L	< 0.30		< 0												

SAMPLE_NAME			BH3 GW1	BH4 GW1	BH5 GW1	BH6 GW1	BH8 GW1	DUP-1	MW16-1A	MW16-1A LAB-DUP	MW16-1	MW16-1 LAB-DUP	MW16-10	MW16-10 LAB-DUP	16-11	MW16-11	MW16-11 LAB-DUP
SAMPLEDATE	09 Aug 2017	08 Aug 2017	08 Aug 2017	08 Aug 2017	08 Aug 2017	11 Aug 2016	09 Aug 2016	09 Aug 2016	17 Mar 2016	17 Mar 2016	03 Aug 2017	03 Aug 2017	25 May 2021	31 Jul 2017	31 Jul 2017		
<b>CHEMICAL_NAME</b>	Ottawa Sewer Use - Sanitary <sup>1</sup>	Ottawa Sewer Use - Storm <sup>1</sup>	Units														
<b>Ottawa-General Chem</b>																	
Fluoride	10	-	mg/L					0.18	0.21		0.17		0.14			0.3	
Sulfide	2	-	mg/L					< 0.0019	< 0.0019		< 0.0019		< 0.0019		0.07		
Sulphate	1500	-	mg/L					130	91		71		45		270		
Total Suspended Solids	350	15	mg/L								11						
<b>Ottawa-Metals</b>																	
Aluminum	50000	-	ug/L					6.67	8.57		315		3.29	3.34	17.5		
Antimony	5000	-	ug/L					0.511	0.412		0.216		0.06	0.061	< 1.0		
Arsenic	1000	20	ug/L					0.378	0.392		1.23		0.508	0.576	< 1.0		
Bismuth	5000	-	ug/L					< 0.005	< 0.005		0.009		< 0.005	< 0.005	< 0.025		
Boron	25000	-	ug/L					34	32		< 10		49	51	55.7		
Cadmium	20	8	ug/L					0.009	0.012		< 0.005		0.009	0.009	< 0.20		
Chromium	5000	80	ug/L					0.48	0.46		14.5		0.21	0.19	< 2.0		
Cobalt	5000	-	ug/L					0.725	0.995		7.84		0.451	0.44	1.05		
Copper	3000	40	ug/L					0.44	0.774		177		1.49	1.45	1.23		
Lead	5000	120	ug/L					0.019	0.025		44.9		0.007	0.006	< 0.50		
Manganese	5000	50	ug/L					202	190		0.21		689	686	226		
Mercury	1	0.4	ug/L					< 0.01	< 0.01		0.02		< 0.01	< 0.01	< 0.01		
Molybdenum	5000	-	ug/L					7.65	4.83		24.4		0.508	0.492	0.62		
Nickel	3000	80	ug/L					1.83	2.75		28.5		1.44	1.34	3.9		
Selenium	5000	20	ug/L					0.553	0.428		0.601		0.107	0.12	2.6		
Silver	5000	120	ug/L					0.025	0.027		< 0.005		< 0.005	< 0.005	< 0.20		
Tin	5000	-	ug/L					0.24	0.79		< 0.2		< 0.2	< 0.2	< 1		
Titanium	5000	-	ug/L					< 0.5	< 0.5		< 0.5		< 0.5	< 0.5	< 2.5		
Vanadium	5000	-	ug/L					0.49	0.59		0.38		0.5	0.5	0.82		
Zinc	3000	40	ug/L					2.04	2.84		3.04		1.53	1.45	< 5.0		
<b>Ottawa-PCBs</b>																	
Aroclors (PCBs), Total	-	0.4	ug/L														
<b>Ottawa-PHC</b>																	
Benzene	10	2	ug/L	< 0.5								< 0.1	< 0.1	< 0.1	< 0.20		
Ethylbenzene	57	2	ug/L	< 0.5								0.52	0.56	< 0.1	< 0.10		
Petroleum Hydrocarbons - F1 (C6-C10)				< 25								< 25	< 25	< 25	< 25		
Petroleum Hydrocarbons - F2 (C10-C16)				< 100								< 100	< 100	< 100	< 100		
Petroleum Hydrocarbons - F3 (C16-C34)				< 100								< 200	< 200	< 100	< 200		
Petroleum Hydrocarbons - F4 (C34-C50)				< 100								< 200	< 200	< 100	< 200		
Toluene	80	2	ug/L	< 0.5								0.69	0.81	< 0.2	< 0.20		
Xylenes, Total	320	4.4	ug/L	< 0.5								0.53	0.49	< 0.1	< 0.20		
<b>Ottawa-Phenols</b>																	
2,4-Dichlorophenol	44.0	-	ug/L					< 0.1	< 0.1				< 0.1		< 0.1		
<b>Ottawa-Semi-VOCs</b>																	
1-Methylnaphthalene	32	-	ug/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.039		< 0.01	< 0.01	< 0.01		
2-Methylnaphthalene	22	-	ug/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.047		< 0.01	< 0.01	< 0.01		
Fluorene	59	0.04	ug/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		< 0.02		< 0.01	< 0.01	< 0.20		
Hexachlorobenzene	0.1	-	ug/L														
Naphthalene	59	6.4	ug/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.16		< 0.01	< 0.01	< 0.20		
Styrene	40	-	ug/L								0.24	0.27	< 0.2	< 0.2	< 0.10		
Tetryl	-	-	ug/L								< 200						
<b>Ottawa-VOCs</b>																	
1,1,1-Trichloroethane	54	-	ug/L									< 0.1	< 0.1	< 0.1	< 0.30		
1,1,2-Tetrachloroethane	40	17	ug/L									< 0.2	< 0.2	< 0.2	< 0.2		
1,1,2-Trichloroethane	800	-	ug/L									< 0.2	< 0.2	< 0.20	< 0.2		
1,1-Dichloroethane	200	-	ug/L									< 0.1	< 0.1	< 0.1	< 0.30		
1,1-Dichloroethylene	40	-	ug/L									< 0.1	< 0.1	< 0.1	< 0.30		
1,2-Dibromoethane	28	-	ug/L									< 0.2	< 0.2	< 0.2	< 0.2		
1,2-Dichlorobenzene	88	5.6	ug/L									< 0.2	< 0.2	< 0.2	< 0.10		
1,2-Dichloroethane	210	-	ug/L									< 0.2	< 0.2	< 0.2	< 0.20		
1,2-Dichloropropane	850	-	ug/L									< 0.1	< 0.1	< 0.1	< 0.20		
1,3-Dichlorobenzene	36	-	ug/L									< 0.2	< 0.2	< 0.2	< 0.10		
1,4-Dichlorobenzene	17	6.8	ug/L									< 0.2	< 0.2	< 0.2	< 0.2		
Bromodichloromethane	350	-	ug/L									< 0.1	< 0.1	< 0.1	< 0.20		
Bromoform	630	-	ug/L									< 0.2	< 0.2	< 0.2	< 0.10		
Bromomethane	110	-	ug/L									< 0.5	< 0.5	< 0.5	< 0.20		
Carbon Tetrachloride	57	-	ug/L									< 0.1	< 0.1	< 0.1	< 0.20		
Chlorobenzene	57	-	ug/L									0.22	0.28	< 0.1	< 0.10		
Chloroform	80	-	ug/L									0.71	0.54	< 0.1	< 0.20		
cis-1,2-Dichloroethene	200	5.2	ug/L									< 0.1	< 0.1	< 0.1	< 0.20		
cis-1,3-Dichloropropene	70	-	ug/L									< 0.2	< 0.2	< 0.2	< 0.2		
Dibromochloromethane	57	-	ug/L									< 0.2	< 0.2	< 0.2	< 0.10		
Methylene Chloride	210	-	ug/L									< 0.5	< 0.5	< 0.5	< 0.30		
Styrene	40	-	ug/L									0.24	0.27	< 0.2	< 0.10		
Tetrachloroethylene	50	4.4	ug/L									< 0.1	< 0.1	< 0.1	< 0.20		
trans-1,3-Dichloropropene	70	5.6	ug/L									< 0.2	< 0.2	< 0.2	< 0.2		
Trichloroethene	54	7.6	ug/L									< 0.1	< 0.1	< 0.1	< 0.20		

## **Notes**

"1" City of Ottawa Sewer Use ByLaw 2003-514 Discharge Criteria

**Bold** underlined indicates an exceedance of the storm sewer discharge criteria

"-" no discharge criteria exist

## Groundwater Quality Results – Sewer Use Discharge Comparison, Ottawa Hospital Site

			SAMPLE_NAME	MW16-12	16-13	DUP-2	MW16-13	MW16-13 LAB-DUP	MW16-14	MW16-14 LAB-DUP	MW16-1A	DUP-1	MW16-3 LAB-DUP	MW16-3/MW16-3 (CAX629)	MW16-5	MW16-5	MW16-5 (CAX630)	MW16-6	
CHEMICAL_NAME	Ottawa Sewer Use - Sanitary <sup>1</sup>	Ottawa Sewer Use - Storm <sup>1</sup>	Units	SAMPLEDATE	10 Aug 2016	07 Jun 2021	11 Aug 2016	10 Aug 2016	10 Aug 2016	01 Aug 2017	01 Aug 2017	25 May 2021	17 Mar 2016	17 Mar 2016	17 Mar 2016	10 Aug 2016	18 Mar 2016	17 Mar 2016	10 Aug 2016
<b>Ottawa-General Chem</b>																			
Fluoride	10	-	mg/L	0.16				0.15		0.19					< 0.1	0.38	0.4	0.12	
Sulfide	2	-	mg/L	< 0.0019				< 0.0019		0.0056					0.0093	0.047	0.014	< 0.0019	
Sulphate	1500	-	mg/L	120				61		77	80				140	170	360	100	
Total Suspended Solids	350	15	mg/L										180		200		110		
<b>Ottawa-Metals</b>																			
Aluminum	50000	-	ug/L	8				4.12		1.9					3.57	5.73		20.4	7.33
Antimony	5000	-	ug/L	0.18	< 1.0			0.286		0.084		< 1.0			0.195	0.422		0.342	0.231
Arsenic	1000	20	ug/L	0.24	< 1.0			0.443		0.202		1.5			0.347	0.869		0.689	0.181
Bismuth	5000	-	ug/L	< 0.025				< 0.005		< 0.005					< 0.005	< 0.005	0.007	< 0.005	
Boron	25000	-	ug/L	< 50	14.8			19		17	184				20	58	89	85	
Cadmium	20	8	ug/L	< 0.025	< 0.20			0.019		< 0.005		< 0.20			< 0.005	< 0.005	< 0.005	0.008	
Chromium	5000	80	ug/L	< 0.5	< 2.0			0.12		0.67		< 2.0			3.43	0.15	0.36	< 0.1	
Cobalt	5000	-	ug/L	0.697	< 0.50			0.243		0.0528		0.69			1.55	0.779	0.612	0.558	
Copper	3000	40	ug/L	0.38	1			0.882		1.26		6.6			27.9	0.773	8.08	0.832	
Lead	5000	120	ug/L	< 0.025	< 0.50			0.01		0.0192		< 0.50			0.225	0.009	0.015	0.016	
Manganese	5000	50	ug/L	289				82.7		2.33					< 0.05	298	96.2	183	
Mercury	1	0.4	ug/L	< 0.01	< 0.02			< 0.01		< 0.01		< 0.02			< 0.01	< 0.01	0.01	< 0.01	
Molybdenum	5000	-	ug/L	4.09	2.57			37.3		4.04		4.51			6.79	130	112	2.58	
Nickel	3000	80	ug/L	1.38	< 3.0			0.927		1.31		4			5.71	5.17	3	1.81	
Selenium	5000	20	ug/L	< 0.2	2.1			0.136		0.515		< 1.0			0.322	0.074	0.207	0.108	
Silver	5000	120	ug/L	0.045	< 0.20			< 0.005		< 0.005		< 0.20			< 0.005	0.011	0.01	< 0.005	
Tin	5000	-	ug/L	< 1				0.28		0.23					< 0.2	< 0.2	< 0.2	< 0.2	
Titanium	5000	-	ug/L	< 2.5				< 0.5		< 0.5					< 0.5	< 0.5	0.57	0.61	
Vanadium	5000	-	ug/L	< 1	< 0.40			1.26		0.6		< 0.40			0.65	0.93	0.43	1.15	
Zinc	3000	40	ug/L	1.61	< 5.0			1.35		2.71		< 5.0			0.99	0.45	0.69	1.44	
<b>Ottawa-PCBs</b>																			
Aroclors (PCBs), Total	-	0.4	ug/L																
<b>Ottawa-PHC</b>																			
Benzene	10	2	ug/L	< 0.1	< 0.20			< 0.1		< 0.1		< 0.20	< 0.1		< 0.1		< 0.1		
Ethylbenzene	57	2	ug/L	< 0.1	< 0.10			< 0.1		< 0.1		< 0.10	0.16		0.13		< 0.1		
Petroleum Hydrocarbons - F1 (C6-C10)				< 25	< 25			< 25		< 25		< 25			< 25		< 25		
Petroleum Hydrocarbons - F2 (C10-C16)				500	500			< 100	< 100	< 100		< 100	< 100		< 100		< 100		
Petroleum Hydrocarbons - F3 (C16-C34)								< 200	< 100	< 200		< 200	< 100		< 200		< 200		
Petroleum Hydrocarbons - F4 (C34-C50)								< 200	< 100	< 200		< 200	< 100		< 200		< 200		
Toluene	80	2	ug/L	< 0.2	< 0.20			< 0.2		< 0.2		< 0.20	0.26		0.25		< 0.2		
Xylenes, Total	320	4.4	ug/L	< 0.1	< 0.20			< 0.1		< 0.1		< 0.20	< 0.1		0.11		< 0.1		
<b>Ottawa-Phenols</b>																			
2,4-Dichlorophenol	44.0	-	ug/L												< 0.1				
<b>Ottawa-Semi-VOCs</b>																			
1-MethylNaphthalene	32	-	ug/L	< 0.01				< 0.01		< 0.01		< 0.01			0.022	0.025	0.018	< 0.01	
2-MethylNaphthalene	22	-	ug/L	< 0.01				< 0.01		< 0.01		< 0.01			0.023	0.029	0.028	< 0.01	
Fluorene	59	0.04	ug/L	< 0.01	< 0.20			< 0.01		< 0.01		< 0.01			< 0.20	0.019	0.031	0.026	
Hexachlorobenzene	0.1	-	ug/L																
Naphthalene	59	6.4	ug/L	< 0.01	< 0.20			< 0.01		< 0.01	0.011				< 0.20	0.1	0.12	0.14	
Styrene	40	-	ug/L	< 0.2	< 0.10			< 0.2		< 0.2		< 0.2			< 0.10	< 0.2	< 0.2	< 0.2	
Tetryl	-	-	ug/L												< 20		< 20	< 2	
<b>Ottawa-VOCs</b>																			
1,1,1-Trichloroethane	54	-	ug/L	< 0.1	< 0.30			< 0.1		< 0									

## Groundwater Quality Results – Sewer Use Discharge Comparison, Ottawa Hospital Site

			SAMPLE_NAME	MW16-6/MW16-6 (CAX631)	MW16-7 LAB-DUP	MW16-7/MW16-7 (CAX632)	MW16-7A	MW16-8-2016.08.11	MW16-9	MW17-04	MW17-05	MW17-05 LAB-DUP	MW17-06	DUP-20170730-A	MW17-07	MW17-07 LAB-DUP	MW17-08	MW17-09
			SAMPLEDATE	17 Mar 2016	17 Mar 2016	17 Mar 2016	10 Aug 2016	11 Aug 2016	11 Aug 2016	31 Jul 2017	30 Jul 2017	30 Jul 2017	02 Aug 2017	30 Jul 2017	30 Jul 2017	30 Jul 2017	02 Aug 2017	30 Jul 2017
CHEMICAL_NAME	Ottawa Sewer Use - Sanitary <sup>1</sup>	Ottawa Sewer Use - Storm <sup>1</sup>	Units															
<b>Ottawa-General Chem</b>																		
Fluoride	10	-	mg/L	< 0.1				0.3	0.13	0.16	0.3	0.14			< 0.1	< 0.1	< 0.1	
Sulfide	2	-	mg/L	< 0.0019				0.0094	< 0.0019	< 0.0095	< 0.0019	0.0024		0.0028	< 0.0019		< 0.0019	
Sulphate	1500	-	mg/L	97				43	170	260	44	24			110	100	23	
Total Suspended Solids	350	15	mg/L	47	20	20												
<b>Ottawa-Metals</b>																		
Aluminum	50000	-	ug/L	4.9			7.96	4.49	9.88	15.5	4.39	4.01	4		2	1.38	5.6	
Antimony	5000	-	ug/L	0.127			0.451	0.315	0.188	0.513	0.12	0.077	0.074		0.042	0.041	0.205	
Arsenic	1000	20	ug/L	0.313			0.444	0.236	0.422	1.59	0.3	0.242	0.226		0.178	0.175	0.219	
Bismuth	5000	-	ug/L	< 0.005			0.008	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
Boron	25000	-	ug/L	59			107	26	50	36	33	18	18		13	12	16	
Cadmium	20	8	ug/L	0.009			0.03	< 0.005	0.027	0.034	0.011	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
Chromium	5000	80	ug/L	6			0.52	< 0.1	0.17	0.32	0.13	0.64	0.63		< 0.1	< 0.1	0.33	
Cobalt	5000	-	ug/L	0.324			3.45	0.413	0.1	3.27	0.661	0.352	0.355		1.65	1.67	0.356	
Copper	3000	40	ug/L	6.47			5.98	0.235	2.04	0.877	4.34	2.9	2.85		0.186	0.209	2.96	
Lead	5000	120	ug/L	0.071			0.063	0.015	0.019	0.04	0.013	0.097	0.094		0.026	0.019	0.104	
Manganese	5000	50	ug/L	45.1			251	12.6	26.6	446	36.2	61.1	61.4		33.4	33.3	26.7	
Mercury	1	0.4	ug/L	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01	< 0.01	
Molybdenum	5000	-	ug/L	2.29			5.39	28.6	3.61	39.6	1.46	20.9	21.3		1.2	1.23	23.5	
Nickel	3000	80	ug/L	4.02			14.7	2.93	2.17	3.7	3.42	1.05	1.04		2.13	2.12	1.61	
Selenium	5000	20	ug/L	0.307			0.341	0.11	0.576	0.591	0.195	0.623	0.607		0.048	0.041	0.344	
Silver	5000	120	ug/L	< 0.005			0.14	0.025	0.014	0.046	< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005	
Tin	5000	-	ug/L	0.76			0.85	0.25	0.5	0.42	< 0.2	0.66	0.68		< 0.2	< 0.2	0.83	
Titanium	5000	-	ug/L	< 0.5			< 0.5	< 0.5	0.74	0.94	< 0.5	< 0.5	< 0.5		< 0.5	< 0.5	< 0.5	
Vanadium	5000	-	ug/L	1.18			< 0.2	0.6	2.59	1.3	0.97	0.6	0.6		< 0.2	< 0.2	0.24	
Zinc	3000	40	ug/L	3.48			3.78	1.28	2.29	3.6	0.78	1.49	1.6		0.51	0.54	6.11	
<b>Ottawa-PCBs</b>																		
Aroclors (PCBs), Total	-	0.4	ug/L															
<b>Ottawa-PHC</b>																		
Benzene	10	2	ug/L	< 0.1			< 0.1		< 0.1	< 0.1	< 0.2		0.18	< 0.2	< 0.2	0.93	< 0.2	
Ethylbenzene	57	2	ug/L	< 0.1			< 0.1		< 0.1	< 0.1	< 0.2		< 0.1	< 0.2	< 0.2	0.15	< 0.2	
Petroleum Hydrocarbons - F1 (C6-C10)				< 25			< 25		< 25		< 25		< 25		< 25		< 25	
Petroleum Hydrocarbons - F2 (C10-C16)				< 100			< 100		< 100		< 100		< 100		< 100		< 100	
Petroleum Hydrocarbons - F3 (C16-C34)				< 200			< 200		< 200		< 200		< 200		< 200		< 200	
Petroleum Hydrocarbons - F4 (C34-C50)				< 200			< 200		< 200		< 200		< 200		< 200		< 200	
Toluene	80	2	ug/L	< 0.2			0.23		< 0.2	0.4	0.54		0.59	< 0.2	< 0.2	1.6	1	
Xylenes, Total	320	4.4	ug/L	< 0.1			0.12		0.11	< 0.1	< 0.2		0.18	< 0.2	< 0.2	2.7	< 0.2	
<b>Ottawa-Phenols</b>																		
2,4-Dichlorophenol	44.0	-	ug/L						< 0.1	< 0.1	< 0.1			< 0.1	< 0.1	< 0.1	< 0.1	
<b>Ottawa-Semi-VOCs</b>																		
1-MethylNaphthalene	32	-	ug/L	< 0.01			< 0.01		< 0.01	< 0.01	< 0.01			< 0.01	< 0.01	< 0.01	< 0.01	
2-MethylNaphthalene	22	-	ug/L	< 0.01			< 0.01		< 0.01	< 0.01	< 0.01		0.011		0.			

		SAMPLE_NAME	MW17-10	MW17-10 LAB-DUP
		SAMPLEDATE	31 Jul 2017	31 Jul 2017
CHEMICAL_NAME	Ottawa Sewer Use - Sanitary <sup>1</sup>	Ottawa Sewer Use - Storm <sup>1</sup>	Units	
<b>Ottawa-General Chem</b>				
Fluoride	10	-	mg/L	0.15
Sulfide	2	-	mg/L	0.0065
Sulphate	1500	-	mg/L	32
Total Suspended Solids	350	15	mg/L	
<b>Ottawa-Metals</b>				
Aluminum	50000	-	ug/L	6.81
Antimony	5000	-	ug/L	0.191
Arsenic	1000	20	ug/L	0.334
Bismuth	5000	-	ug/L	< 0.005
Boron	25000	-	ug/L	35
Cadmium	20	8	ug/L	< 0.005
Chromium	5000	80	ug/L	0.22
Cobalt	5000	-	ug/L	2.09
Copper	3000	40	ug/L	1.82
Lead	5000	120	ug/L	0.007
Manganese	5000	50	ug/L	<b>569</b>
Mercury	1	0.4	ug/L	< 0.01
Molybdenum	5000	-	ug/L	25
Nickel	3000	80	ug/L	3.23
Selenium	5000	20	ug/L	0.151
Silver	5000	120	ug/L	< 0.005
Tin	5000	-	ug/L	0.84
Titanium	5000	-	ug/L	< 0.5
Vanadium	5000	-	ug/L	0.23
Zinc	3000	40	ug/L	0.86
<b>Ottawa-PCBs</b>				
Aroclors (PCBs), Total	-	0.4	ug/L	
<b>Ottawa-PHC</b>				
Benzene	10	2	ug/L	0.39
Ethylbenzene	57	2	ug/L	0.15
Petroleum Hydrocarbons - F1 (C6-C10)			ug/L	< 25
Petroleum Hydrocarbons - F2 (C10-C16)			ug/L	< 100
Petroleum Hydrocarbons - F3 (C16-C34)			ug/L	< 200
Petroleum Hydrocarbons - F4 (C34-C50)			ug/L	< 200
Toluene	80	2	ug/L	<b>4.1</b>
Xylenes, Total	320	4.4	ug/L	0.87
<b>Ottawa-Phenols</b>				
2,4-Dichlorophenol	44.0	-	ug/L	0.1
<b>Ottawa-Semi-VOCs</b>				
1-Methylnaphthalene	32	-	ug/L	0.014
2-Methylnaphthalene	22	-	ug/L	0.019
Fluorene	59	0.04	ug/L	< 0.01
Hexachlorobenzene	0.1	-	ug/L	< 0.005
Naphthalene	59	6.4	ug/L	0.062
Styrene	40	-	ug/L	< 0.2
Tetryl	-	-	ug/L	
<b>Ottawa-VOCs</b>				
1,1,1-Trichloroethane	54	-	ug/L	< 0.1
1,1,2,2-Tetrachloroethane	40	17	ug/L	< 0.2
1,1,2-Trichloroethane	800	-	ug/L	< 0.2
1,1-Dichloroethane	200	-	ug/L	< 0.1
1,1-Dichloroethylene	40	-	ug/L	< 0.1
1,2-Dibromoethane	28	-	ug/L	< 0.2
1,2-Dichlorobenzene	88	5.6	ug/L	< 0.2
1,2-Dichloroethane	210	-	ug/L	< 0.2
1,2-Dichloropropane	850	-	ug/L	< 0.1
1,3-Dichlorobenzene	36	-	ug/L	< 0.2
1,4-Dichlorobenzene	17	6.8	ug/L	< 0.2
Bromodichloromethane	350	-	ug/L	< 0.1
Bromoform	630	-	ug/L	< 0.2
Bromomethane	110	-	ug/L	< 0.5
Carbon Tetrachloride	57	-	ug/L	< 0.1
Chlorobenzene	57	-	ug/L	< 0.1
Chloroform	80	-	ug/L	< 0.1
cis-1,2-Dichloroethene	200	5.2	ug/L	< 0.1
cis-1,3-Dichloropropene	70	-	ug/L	< 0.2
Dibromochloromethane	57	-	ug/L	< 0.2
Methylene Chloride	210	-	ug/L	< 0.5
Styrene	40	-	ug/L	< 0.2
Tetrachloroethylene	50	4.4	ug/L	< 0.01
trans-1,3-Dichloropropene	70	5.6	ug/L	< 0.2
Trichloroethene	54	7.6	ug/L	< 0.1

**Notes:**

"1" City of Ottawa Sewer Use ByLaw 2003-514 Discharge Criteria

**Bold** underlined indicates an exceedance of the storm sewer discharge criteria

" " no discharge criteria exist