



BRANDON LAGOONS CELL 4 DECOMMISSIONING GROUNDWATER SAMPLING PLAN PFIZER INC.

PROJECT NO.: WX17989
DATE: MARCH/2023



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" Effective September 21, 2022, Wood Environment & Infrastructure Solutions Canada Limited is now operating as WSP E&I Canada Limited. No other aspects of our legal entity, contractual terms or capabilities have changed in relation to this report submission."

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks				
Date	15 February 2023	8 March 2023		
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Signature				
Project number	WX17989			
Report number				
File reference				

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1 INTRODUCTION

Pfizer Inc. (Pfizer) retained WSP E&I Canada Limited (WSP) to prepare a Groundwater Sampling Plan in support of the decommissioning of the City of Brandon (the City) Waste Water Treatment Lagoon Cell 4 (Cell 4). Cell 4 is a component of the City of Brandon wastewater treatment lagoon system located Sections 21 and 22-10-18 WPM in Brandon, Manitoba (the Site).

The City is proposing to decommission Cell 4 of the wastewater lagoon system from industrial use, in fulfillment of Section 37 of the City's *Environment Act* Licence No. 2991 (the Licence). A Notice of Alteration Report (NoA) was completed by WSP (formerly Wood Canada Limited) in May 2021, which presented a detailed decommissioning plan for Cell 4. A component of the decommissioning plan is the installation of a groundwater monitoring well network to monitor the potential for adverse impacts to groundwater quality. Once Cell 4 is decommissioned from its current use, the City anticipates using the cell for wet weather wastewater capacity.

This proposed Groundwater Sampling Plan is in fulfillment of a requirement stated in response to the Environment Act Licence No. 2991 Notice of Alteration Request dated 8 December 2022.

2 SITE DESCRIPTION

The City's wastewater treatment lagoons were constructed in 1964 for the treatment of municipal sewage and wastewater generated by the City. Since 1981, Cell 4 was reportedly dedicated for treatment of industrial wastewater from the Wyeth Organics (acquired by Pfizer in 2009) facility in Brandon.

Wastewater treated in Cell 4 consisted of Spent Pregnant Mares Urine (SPMU) which was derived from a combination of process wastewater, wash-water and rinse-water mix. The SPMU was characterized as a high organic strength, nitrogen rich, high saline and alkaline waste stream. The wastewater also contained equine hormones, and, prior to 2010, the preservative compound referred to as Compound A. SPMU discharge to Cell 4 ended in 2013.

Following the completion of upgrades to the City of Brandon Industrial Wastewater Treatment Plant in 2013, wastewater generated at the Pfizer Brandon Facility is now directed to the new treatment plant and no longer requires the use of Cell 4. Additionally, it is understood that wastewater from the City of Brandon operated Cell 3 has been added to Cell 4 as a part of the City of Brandon management of the WasteWater Treatment Lagoons. The additional amount and chemical make up of wastewater added to the Cell 4 lagoon is unknown, however, it is possible that the wastewater has been added periodically to top up lagoon levels or as a relief from Cell 3.

2.1 CURRENT SITE FACILITIES

Based on current information, Cell 4 presently includes the following facilities:

Cell 4 (main cell) – Cell 4 in its current configuration consists of a lagoon cell approximately 319,000 square meters in area. It is connected to Cell 4A, as well as Cell 3 and Cell 5 through controlled inlet/outlet infrastructure. An aeration system consisting of aerators, and electrical infrastructure was formerly present within the Cell 4 lagoon, however, was previously removed.

Cell 4A (clarification cell) - Cell 4A was constructed in the early 1990s to increase treatment capabilities and capacity of Cell 4. Cell 4A design drawings indicate the size was approximately 22,000 m³, with a design depth greater approximately 2.5 m deeper than the Cell 4 main cell. The Cell 4A infrastructure includes the transfer chamber to Cell 5, a transfer chamber to Cell 4, as well as sludge piping inset into the bottom of the lagoon.

Cell 4B - Cell 4B was constructed for storage of SPMU prior to treatment, however, was reportedly never used. The Cell 4B has an approximate capacity of 13,600 m³ and is currently a dry, grass covered cell.

Control Building - A control building is in the southwest portion of the Cell 4 facility. The building was constructed in approximately 1993. The building consists of a SPMU unloading station on the west side of the building, with a two-level building. The building houses a workshop, pumps, piping and tankage associated with pumping and management of the unloaded SPMU and the management of the lagoon. A small transformer yard is located adjacent to the east of the building.

Related Infrastructure - Includes the existing 33 kv power feed to the Cell 4 lagoon control building and north electrical building on the north side of the lagoon. As well electrical lines are buried electrical feeds to electrical subs around the lagoon associated with the former aerator system.

3 PREVIOUS INVESTIGATIONS

A baseline groundwater investigation was completed in November 2022 to assess groundwater quality within the vicinity of Cell 4 prior to the commencement of decommissioning activities. A total of five test holes were completed as groundwater monitoring wells, four advanced around the perimeter of Cell 4 and one advanced upgradient of the Cell to assess background conditions. The baseline groundwater sampling program included measurement of groundwater levels as well as temperature, electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), pH, and oxidation/reduction potential (ORP). Groundwater samples from each monitoring were collected and submitted for laboratory analyses of dissolved concentrations of Compound A, routine water chemistry parameters (Ca, Mg, Na, K, Cl, F, SO₄, NO₂, NO₃, NO₂+NO₃, Hardness, Alkalinity, pH, EC, TDS), DOC, and dissolved metals.

Results of the baseline investigation indicated that concentrations of Compound A were below laboratory detection limits in all groundwater samples. Select concentrations of dissolved metals were above the applicable environmental quality guidelines protective of freshwater aquatic life.

The Site location and surrounding area are shown on Figure 1. The layout of the Site is shown on Figure 2. Groundwater analytical results of the baseline investigation and associated groundwater assessment guidelines are presented in the attached Table 1.

4 PROPOSED GROUNDWATER SAMPLING PLAN

The proposed groundwater sampling plan program will assess groundwater quality within the vicinity of Cell 4 throughout and following the decommissioning activities. Findings will be compared to results of the baseline groundwater investigation.

4.1.1 METHODOLOGY

The following scope for the proposed groundwater sampling plan is recommended:

- Conduct groundwater monitoring and sampling of five installed monitoring wells:
 - Measure groundwater levels and field parameters (DO, ORP, EC, pH, and temperature).
 - Develop each monitoring well using dedicated Waterra tubing or bailers to purge the well of a minimum of three well volumes or until they have been purged dry.
 - Collect groundwater samples from each monitoring for laboratory analysis of dissolved concentrations of Compound A, routine water chemistry parameters (Ca, Mg, Na, K, Cl, F, SO₄, NO₂, NO₃, NO₂+NO₃, Hardness, Alkalinity, pH, EC, TDS), DOC, and dissolved metals inclusive of those indicative of lagoon water.
-

4.1.2 GROUNDWATER MONITORING FREQUENCY

The proposed frequency of groundwater sampling is twice per year during decommissioning activities. One sampling event will be completed in June and one completed in October following the end of the field season. Decommissioning activities will be completed from June 15th to October 1st as outlined in Environment Act Licence No. 2991. In subsequent years following the completion of decommissioning activities, the frequency of monitoring may be reduced to once per year based on the previous year's findings and dependant on the approval from the Director. It is anticipated that groundwater sampling will be completed for a minimum of three years following the completion of decommissioning activities.

4.1.3 GROUNDWATER QUALITY STANDARDS

Manitoba Environment and Climate (MEC) has adopted the principles established by Canadian Council of Ministers of the Environment (CCME) for environmental management and assessment of sites in Manitoba, in addition to the requirements of the Manitoba Contaminated Sites Remediation Act (CSRA) and the Manitoba Contaminated Sites Remediation Regulation M.R. 105/97 (CSRR). The Environmental Site Assessment process in Manitoba is outlined in the MEC June 2016 Guideline document "Environmental Site Assessments in Manitoba" which discusses the derivation process to determine the applicable Assessment Guidelines and CSRR Reporting Standards for potentially impacted soil, groundwater, surface water or sediment.

The Assessment Guidelines for the Site are used to determine the significance of risk to human health and the environment associated with the constituents of concern discovered by an ESA and what future action is recommended to address the risk for the site. The Assessment Guidelines can be derived primarily from the Environmental Quality Guidelines (EQGs) published by CCME; however, should the CCME not provide adequate

information or guidance, documents from other jurisdictions may be used, provided they are supported as the most scientifically valid Assessment Guidelines for the Site.

The following documents produced by CCME and other jurisdictions were selected as being applicable for assessment of the Site dependant on the constituents of concern, pathways, and receptors:

- CCME 1999 (updates to 2022). Canadian Environmental Quality Guidelines (EQGs).
- Ontario Ministry of the Environment. (MOE, 2011). Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

For comparison purposes, groundwater chemical data will be compared against background data and with groundwater quality guidelines provided by CCME and MOE referenced above.

4.1.4 REPORTING

A written summary report will be provided annually following the completion of each field season. The report will include results of completed sampling events, including relevant analytical results and interpretation of all the data that was collected.

The annual summary reports will include, but not be limited to, the following items:

- Site location map.
- Site Plan showing all relevant features and groundwater monitoring wells.
- Figures showing groundwater analytical results.
- Tables showing groundwater analytical results.
- Conclusions and recommendations for further monitoring, additional site investigation or program closure, as required.
- Appendices including site photographs, laboratory certificates of analysis (including chain of custody) for groundwater, and quality assurance and quality control.

5 CLOSURE

This report has been prepared for the exclusive use of Pfizer and the City of Brandon. This report is based on, and limited by, the interpretation of data, circumstances, and conditions available at the time of completion of the work as referenced throughout the report. It has been prepared in accordance with generally accepted engineering practices. Further general limitations are provided in Appendix B.

Yours sincerely,



Eryn Williamson, M.Sc., P.Ag.
Environmental Scientist

Reviewed by:



Scott Chapman, M.Sc., P.Eng.
Senior Environmental Engineer

6 REFERENCES

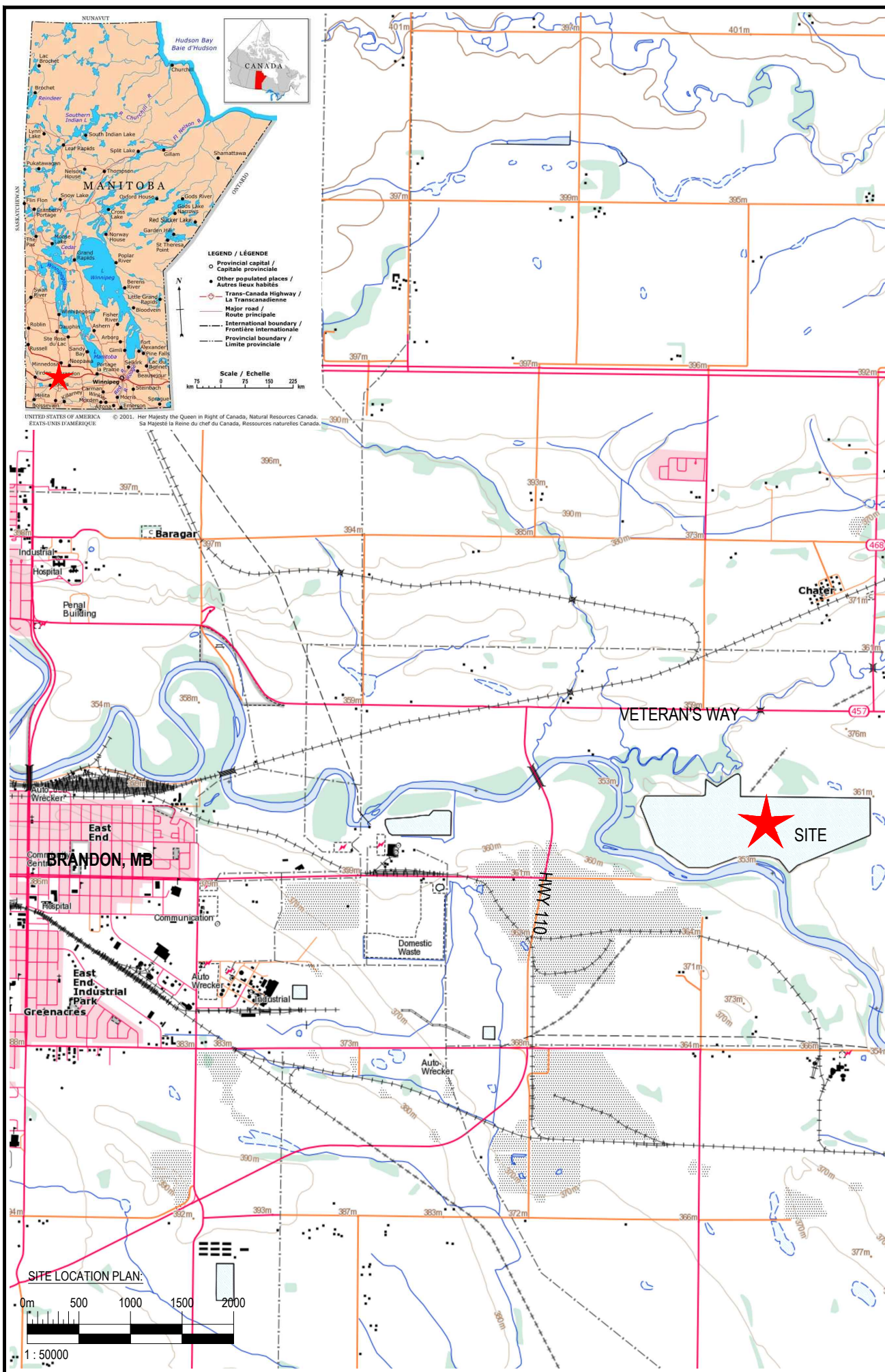
- Canadian Council of Ministers of the Environment (CCME). 1999, updates to 2018. Canadian Environmental Quality Guidelines (EQGs).
- Environmental Sampling Memo, WasteWater Treatment Lagoon Cell 4, Brandon, Manitoba. (January 2023). Environmental Sampling Memo. Prepared by WSP for Pfizer Inc.
- Ontario Ministry of the Environment (MOE). 2011. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act.

Figures

Figure 1 Site and Surrounding Land Use Plan

Figure 2 Site Plan





6 HIGH LEVEL ROAD
OAK BLUFF, MANITOBA R4G 0E2
TEL (204) 488-2997

CLIENT:

PFIZER INC.

LEGEND:

APPROXIMATE SITE LOCATION

NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE

BASELINE GROUNDWATER MONITORING PROGRAM

BRANDON LAGOONS

SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

**SITE AND SURROUNDING
LAND USE PLAN**

SCALE: AS SHOWN
DATE: DECEMBER 2022
DRAWN BY: MD
PROJECT NO: WX17989

FIGURE 1








6 HIGH LEVEL ROAD
OAK BLUFF, MANITOBA R4G 0E2
TEL (204) 488-2997



CLIENT:

PFIZER INC.

LEGEND:

-  SOIL SAMPLE LOCATION
-  PROPOSED MONITORING WELL
-  BURIED PIPES
-  ELECTRICAL LINE O/H
-  ELECTRICAL LINE U/G



NOTE:
- SITE FEATURE LOCATIONS ARE APPROXIMATE

BASELINE GROUNDWATER MONITORING PROGRAM

BRANDON LAGOONS

SW 22-10-18 W1 & SE 22-10-18 W1
BRANDON, MANITOBA

SITE PLAN

SCALE: AS SHOWN
 DATE: DECEMBER 2022
 DRAWN BY: MD
 PROJECT NO: WX17989

FIGURE 2

Tables



TABLE 1: GROUNDWATER ANALYTICAL RESULTS

Parameter	Units	MW22-01	MW22-02	MW22-03	MW22-04	MW22-05	MW22-15 (duplicate of MW22-05)	Assessment Guideline
	Date	15-Nov-2022	15-Nov-2022	15-Nov-2022	15-Nov-2022	15-Nov-2022	15-Nov-2022	
Physical Tests (Water)								
Conductivity	umhos/cm	2440	8010	3870	2380	2180	2180	NG
Hardness (as CaCO3)	mg/L	1310	2170	1970	651	557	564	NG
pH	pH units	7.77	7.56	7.59	8.16	8.20	8.20	6.5 to 9.0 ¹
TDS (Calculated)	mg/L	1840	6380	3060	1450	1310	1300	NG
Anions and Nutrients (Water)								
Alkalinity, Total (as CaCO3)	mg/L	577	1650	881	765	685	676	NG
Bicarbonate (HCO3)	mg/L	704	2010	1070	933	835	824	NG
Carbonate (CO3)	mg/L	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	NG
Chloride (Cl)	mg/L	82.0	368	182	230	216	213	1800 ²
Hydroxide (OH)	mg/L	<0.34	<0.34	<0.34	<0.34	<0.34	<0.34	NG
Nitrate and Nitrite as N	mg/L	0.24	<1.1	<0.45	<0.22	<0.22	<0.22	NG
Nitrate (as N)	mg/L	0.24	<1.0	<0.40	<0.20	<0.20	<0.20	13 ¹
Nitrite (as N)	mg/L	<0.10	<0.50	<0.20	<0.10	<0.10	<0.10	0.06 ¹
Sulfate (SO4)	mg/L	826	3070	1440	236	209	205	NG
Organic / Inorganic Carbon (Water)								
Dissolved Organic Carbon	mg/L	12.6	38.6	10.5	14.7	18.4	19.6	NG
Dissolved Metals (Water)								
Aluminum (Al)-Dissolved	mg/L	<0.0010	<0.0010	0.0011	0.0027	<0.0010	<0.0010	0.1 ¹
Antimony (Sb)-Dissolved	mg/L	0.00022	0.00040	0.00016	0.00029	0.00013	0.00014	16 ²
Arsenic (As)-Dissolved	mg/L	0.00107	0.00239	0.00217	0.0124	0.0109	0.0103	0.005 ¹
Barium (Ba)-Dissolved	mg/L	0.0716	0.0267	0.0286	0.194	0.174	0.183	23 ²
Beryllium (Be)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.053 ²
Bismuth (Bi)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	NG
Boron (B)-Dissolved	mg/L	0.231	0.306	0.320	0.381	0.333	0.333	1.5 ¹
Cadmium (Cd)-Dissolved	mg/L	0.000110	0.0000790	0.000179	0.0000290	0.0000312	0.0000177	0.00037 ¹
Calcium (Ca)-Dissolved	mg/L	256	469	400	105	98.9	98.2	NG
Cesium (Cs)-Dissolved	mg/L	<0.000010	0.000026	<0.000010	0.000031	<0.000010	0.000010	NG
Chromium (Cr)-Dissolved	mg/L	<0.00010	0.00012	<0.00010	<0.00010	<0.00010	<0.00010	0.64 ²
Cobalt (Co)-Dissolved	mg/L	0.00203	0.0159	0.0307	0.00171	0.00475	0.00492	0.052 ²
Copper (Cu)-Dissolved	mg/L	0.00344	0.0108	0.00481	0.00150	0.00310	0.00106	0.004 ¹
Iron (Fe)-Dissolved	mg/L	<0.010	0.037	<0.010	0.024	<0.010	0.027	0.3 ¹
Lead (Pb)-Dissolved	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.007 ¹
Lithium (Li)-Dissolved	mg/L	0.221	0.319	0.378	0.147	0.119	0.115	NG
Magnesium (Mg)-Dissolved	mg/L	163	242	236	94.3	75.4	77.4	NG
Manganese (Mn)-Dissolved	mg/L	1.83	4.82	3.46	0.562	3.54	3.57	0.52 ¹
Molybdenum (Mo)-Dissolved	mg/L	0.00415	0.00623	0.00954	0.0295	0.0189	0.0187	0.073 ¹
Nickel (Ni)-Dissolved	mg/L	0.0276	0.119	0.0889	0.0182	0.0245	0.0246	0.15 ¹
Phosphorus (P)-Dissolved	mg/L	<0.030	0.046	<0.030	<0.030	<0.030	<0.030	0.1 ¹
Potassium (K)-Dissolved	mg/L	17.6	16.2	11.4	12.7	13.7	13.7	NG
Rubidium (Rb)-Dissolved	mg/L	0.00425	0.00994	0.00469	0.00553	0.00291	0.00299	NG
Selenium (Se)-Dissolved	mg/L	0.000374	0.00105	0.000563	0.000376	0.000233	0.000368	0.001 ¹
Silicon (Si)-Dissolved	mg/L	16.3	16.8	18.1	21.3	18.9	19.3	NG
Silver (Ag)-Dissolved	mg/L	<0.000010	0.000019	<0.000010	<0.000010	<0.000010	<0.000010	0.00025 ¹
Sodium (Na)-Dissolved	mg/L	153	1230	257	317	282	287	1800 ²
Strontium (Sr)-Dissolved	mg/L	1.34	2.69	1.99	0.747	0.658	0.667	NG
Sulfur (S)-Dissolved	mg/L	306	892	507	89.5	79.1	77.9	NG
Tellurium (Te)-Dissolved	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	NG
Thallium (Tl)-Dissolved	mg/L	0.000075	0.000417	0.000342	0.000052	0.000015	<0.000010	0.0008 ¹
Thorium (Th)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	NG
Tin (Sn)-Dissolved	mg/L	0.00018	0.00021	<0.00010	<0.00010	0.00013	<0.00010	NG
Titanium (Ti)-Dissolved	mg/L	<0.00030	0.00033	<0.00030	<0.00030	<0.00030	<0.00030	NG
Tungsten (W)-Dissolved	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	NG
Uranium (U)-Dissolved	mg/L	0.0126	0.0551	0.0694	0.00219	0.00434	0.00430	0.015 ¹
Vanadium (V)-Dissolved	mg/L	0.00053	0.00059	<0.00050	<0.00050	0.00059	<0.00050	0.200 ²
Zinc (Zn)-Dissolved	mg/L	0.0033	0.0071	0.0080	0.0111	0.0013	0.0014	0.007 ¹
Zirconium (Zr)-Dissolved	mg/L	0.00023	0.00367	0.00041	<0.00020	<0.00020	<0.00020	NG
Hexachlorophene	µg/L	ND	ND	ND	ND	ND	ND	0.88 ³

Notes:

- m - metre
- mg/L - concentration in milligrams per litre
- µg/L - concentration in microgram per litre
- < - less than the method detection limit
- NG - No Guideline
- ND - Not Detected

BOLD above applicable reporting standard

¹ CCME EQG Canadian Water Quality Guidelines for the Protection of Aquatic Life as outlined in the Canadian Council of the Ministers of the Environment (CCME) "Canadian Environmental Quality Guidelines", 1999 (updates to 2019).

² Standard selected from the Ontario Ministry of Environment's Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Ground Water Condition. Table 9.

³ Ecological screening benchmark guideline (Golder & Associates, 2011).

Appendix A

Limitations



Limitations

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:
 - a. The Standard Terms and Conditions which form a part of our Professional Services Contract;
 - b. The Scope of Services;
 - c. Time and Budgetary limitations as described in our Contract; and
 - d. The Limitations stated herein.
2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The conclusions presented in this report were based, in part, on visual observations of the Site and attendant structures. Our conclusions cannot and are not extended to include those portions of the Site or structures, which are not reasonably available, in WSP's opinion, for direct observation.
4. The environmental conditions at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the Site with any applicable local, provincial or federal bylaws, orders-in-council, legislative enactments and regulations was not performed.
5. The Site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.
6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on-site and may be revealed by different or other testing not provided for in our contract.
7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, WSP must be notified in order that it may determine if modifications to the conclusions in the report are necessary.
8. The utilization of WSP's services during the implementation of any remedial measures will allow WSP to observe compliance with the conclusions and recommendations contained in the report. WSP's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.
9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. WSP accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.
10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of WSP.
11. Provided that the report is still reliable, and less than 12 months old, WSP will issue a third-party reliance letter to parties that the client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on WSP's report, by such reliance agree to be bound by our proposal and WSP's standard reliance letter. WSP's standard reliance letter indicates that in no event shall WSP be liable for any damages, howsoever arising, relating to third-party reliance on WSP's report. No reliance by any party is permitted without such agreement.