

## Water Quality 2021

### 7.1 Water Quality Objectives for EPCOR

2021

Parameter	Approval Requirement	EPCOR Internal Limit	EPCOR Target
Turbidity (NTU)			
Individual Filters	<0.3	<0.1 (2)	<0.08
Distribution System	< 5 (3)	< 1 (1)	< 1
Distribution System (Maintenance)	< 5 (3)	< 3 (1)	< 1
Colour (TCU)	<15 (3)	<10 (1)	<3
pH (25°C)	6.5 - 8.5	7.3 - 8.3 (1)	7.4 - 8.0
Taste and Odour	Inoffensive (3)	Inoffensive (1)	Inoffensive
E.coli (PA/100 mL)	absent	absent (1)	absent
Total Coliforms (PA/100 mL)	absent	absent (1)	absent
Total Chlorine Residual (mg/L)			
Water Treatment Plant Effluent	>1.0	1.3 - 2.4 (2)	1.9 - 2.2
Reservoirs	>0.5	1.0 - 2.4 (1)	1.2 - 2.2
Distribution	>0.5 (4)	1.0 - 2.4 (1)	1.0 - 2.2
Fluoride: (mg/L)			
Reservoir Effluent	0.5 - 0.9	0.6 - 0.8 (1)	0.6 - 0.8
Trihalomethanes (mg/L)			
Reservoir Effluent	<0.100	<0.050 (1)	<0.040
Distribution System	<0.100	<0.050 (1)	<0.040
UV254 % Transmittance			
E.L. Smith		>89% (2)	>90%
Rossdale		>87% (2)	>88%
HAA (mg/L)			
Reservoir Effluent	< 0.080	< 0.040 (1)	<0.035
Distribution System	< 0.080	< 0.040 (1)	<0.035
NDMA (mg/L):			
Reservoir Effluent	< 0.000040	< 0.000010 (1)	<0.000005
Distribution System	< 0.000040	< 0.000010 (1)	
Microorganism Log Removal at Water			
<i>Giardia</i>	≥5.5	≥6.0 (2)	>6.5
<i>Cryptosporidium</i>	≥5.5	≥5.3 (2)	>6.0
Virus	≥4.0	≥4.5 (2)	>5.0

(1) Limit based on City of Edmonton Performance Based Rate (PBR) agreement

(2) Limit based on EPCOR Action Level

(3) Aesthetic Objective

(4) in 75% of samples collected in a day

All values are expressed in units of mg/L unless otherwise stated.

Based on January 2017 Summary of Epcor Edmonton Water Quality Standards.

**7.2 SUMMARY OF MAJOR CHEMICALS, MICROBIOLOGICAL, AND PHYSICAL  
PARAMETERS OF EDMONTON DRINKING WATER PRODUCED  
AT WATER TREATMENT PLANTS**

**2021**

<b>Parameter</b>	<b>Unit</b>	<b>MAC*</b>	<b>Average</b>	<b>Median</b>	<b>Min</b>	<b>Max</b>	<b>Count</b>
Alkalinity Total	mg CaCO3/L		126	120	96	145	728
Aluminum	mg/L	2.9	0.114	0.086	0.029	0.179	24
Arsenic	mg/L	0.01	<0.0002	<0.0002	<0.0002	0.0003	24
Bromate Dissolved	mg/L	0.01	<0.005	<0.005	<0.005	<0.005	111
Bromodichloromethane	µg/L		<0.5	<0.5	<0.5	2.6	728
Cadmium	mg/L	0.005	<0.0002	<0.0002	<0.0002	<0.0002	24
Calcium Hardness	mg CaCO3/L		112	110	87	134	728
Chlorate Dissolved	mg/L	1	0.103	0.116	0.050	0.202	111
Chloride Dissolved	mg/L	(250)	5.52	5.49	2.96	10.80	111
Chlorite Dissolved	mg/L	1	<0.01	<0.01	<0.01	<0.01	111
Chromium	mg/L	0.05	<0.0002	<0.0002	<0.0002	<0.0002	24
Colour	TCU	(15)	0.7	0.7	<0.5	2.4	728
Conductivity	µS/cm	(<1)	371	369	314	455	105
Copper	mg/L	(1)	<0.0050	<0.0050	<0.0050	<0.0050	24
Fluoride	mg/L	1.5	0.68	0.67	0.55	0.72	728
Haloacetic Acids, total (HAA5)	ug/L	80	15.2	16.2	9.6	27.4	24
Hardness, Total	mg CaCO3/L		172	170	137	203	728
Iron	mg/L	(0.3)	<0.0050	<0.0050	<0.0050	<0.0050	24
Lead	mg/L	0.005	<0.0002	<0.0002	<0.0002	<0.0002	24
Manganese	mg/L	0.12 (0.02)	<0.0020	<0.0020	<0.0020	<0.0020	24
Mercury	mg/L	0.001	<0.0002	<0.0002	<0.0002	<0.0002	24
Nitrate (as N) Dissolved	mg/L	10	0.080	0.070	0.030	0.175	111
Nitrite (as N) Dissolved	mg/L	1	<0.01	0.02	<0.01	0.05	111
pH	N/A	(7.0 - 10.5)	7.9	7.9	7.4	8.2	728
Potassium	mg/L		0.70	0.70	0.60	1.00	24
Sodium	mg/L	(200)	7.24	7.55	5.70	23.90	24
Sulphate Dissolved	mg/L	(500)	54.8	55.5	48.8	95.1	111
Total Chlorine	N/A	>1.0		2.06	1.94	2.18	8
Total Dissolved Solids	mg/L	(500)	206	220	179	272	24
Total Organic Carbon	mg/L C		1.0	1.1	0.7	3.0	105
Trihalomethanes	µg/L	100	8.2	10.4	3.5	36.9	728
Turbidity	NTU		0.05	<0.04	<0.04	0.17	728
Uranium	mg/L	0.02	<0.0005	<0.0005	<0.0005	0.0006	24
Zinc	mg/L	(5.0)	<0.0050	<0.0050	<0.0050	<0.0050	24
<b>Bacteriological Data</b>							
Coliforms, total	PA/100mL		Absent	Absent	Absent	Absent	728
E. coli	PA/100mL		Absent	Absent	Absent	Absent	728

### 7.3 SUMMARY OF LABORATORY ANALYSIS - 2021

#### Testing of the Edmonton Drinking Water

##### Drinking Water Testing

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Water Treatment Plant	# Tests	7,438	6,862	8,099	7,477	7,399	7,314	7,561	7,512	7,204	7,230	7,304	7,462	88,862
	# Samples	273	249	367	301	266	256	265	268	271	268	269	272	3,325
Field Reservoirs	# Tests	801	883	858	814	891	949	805	955	805	874	818	684	10,137
	# Samples	66	57	69	58	57	71	56	73	56	53	61	48	725
Routine Distribution System	# Tests	770	869	811	855	771	779	797	774	776	786	694	710	9,392
	# Samples	178	171	171	158	161	166	162	172	173	159	157	156	1,984
System Depressurization/Repair	# Tests	212	428	192	176	212	340	276	354	316	384	472	296	3,658
	# Samples	53	107	48	44	53	86	69	89	79	96	119	74	917
Customer Complaints	# Tests	200	200	268	340	509	1,192	1,748	1,554	814	1,036	1,034	740	9,635
	# Samples	5	4	4	5	8	17	25	21	11	14	14	10	138
<b>Total</b>	# Tests	9,421	9,242	10,228	9,662	9,782	10,574	11,187	11,149	9,915	10,310	10,322	9,892	121,684
	# Samples	575	588	659	566	545	596	577	623	590	590	620	560	7,089

##### Additional Testing

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
New Watermain Testing	# Tests	0	10	10	40	10	55	130	65	190	405	765	345	2,025
	# Samples	0	2	2	8	2	11	26	13	38	81	153	69	405
Water Treatment Plant Waste Discharge	# Tests	159	76	75	202	32	122	115	61	84	51	74	102	1,153
	# Samples	38	38	44	38	28	62	54	48	34	38	52	48	522
Quality Control	# Tests	4,257	4,038	4,360	3,405	3,333	4,002	4,416	4,021	4,065	4,057	3,924	4,310	48,188
	# Samples	649	775	761	737	678	793	978	790	787	819	888	755	9,410
Externally Contracted Analyses	# Tests	106	115	142	115	112	138	115	170	112	107	158	104	1,494
	# Samples	53	57	73	57	56	69	57	73	56	55	67	52	725
<b>Total</b>	# Tests	4,522	4,239	4,587	3,762	3,487	4,317	4,776	4,317	4,451	4,620	4,921	4,861	52,860
	# Samples	740	872	880	840	764	935	1,115	924	915	993	1,160	924	11,062

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<b>Total</b>	# Tests	13,943	13,481	14,815	13,424	13,269	14,891	15,963	15,466	14,366	14,930	15,243	14,753	174,544
	# Samples	1,311	1,455	1,535	1,401	1,305	1,527	1,687	1,543	1,501	1,578	1,776	1,480	18,099

**7.4 Bacteriological Data: Water Treatment Plants  
2021**

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
<b>January</b>															
Rossdale Raw (MPN/100mL)	33	0	0.0	76	1	291	0	0.0	8	1	39	1	15.7	15.7	15.7
E.L. Smith Raw (MPN/100mL)	4	0	0.0	43	25	82	0	0.0	1	1	1	1	15.2	15.2	15.2
<b>Raw River Water Entering the Treatment Plants</b>	<b>37</b>	<b>0</b>	<b>0.0</b>	<b>73</b>	<b>1</b>	<b>291</b>	<b>0</b>	<b>0.0</b>	<b>7</b>	<b>1</b>	<b>39</b>	<b>2</b>	<b>15.4</b>	<b>15.2</b>	<b>15.7</b>
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.22	0.04	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.20	0.02	1.00
<b>Water Entering the Plant Reservoir</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.21</b>	<b>0.02</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.29	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.31	0.04	1.00
<b>Treated Water Entering the Distribution System</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.30</b>	<b>0.03</b>	<b>1.00</b>
<b>February</b>															
Rossdale Raw (MPN/100mL)	30	0	0.0	95	1	387	0	0.0	12	1	58	1	10.7	10.7	10.7
E.L. Smith Raw (MPN/100mL)	5	0	0.0	41	20	64	0	0.0	1	1	1	1	8.49	8.49	8.49
<b>Raw River Water Entering the Treatment Plants</b>	<b>35</b>	<b>0</b>	<b>0.0</b>	<b>87</b>	<b>1</b>	<b>387</b>	<b>0</b>	<b>0.0</b>	<b>10</b>	<b>1</b>	<b>58</b>	<b>2</b>	<b>9.61</b>	<b>8.49</b>	<b>10.7</b>
Rossdale Treated (PA/100mL)	28	0	0.0				0	0.0				28	0.25	0.03	1.00
E.L. Smith Treated (PA/100mL)	28	0	0.0				0	0.0				28	0.20	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>56</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>56</b>	<b>0.23</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	28	0	0.0				0	0.0				28	0.28	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	28	0	0.0				0	0.0				28	0.21	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>56</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>56</b>	<b>0.25</b>	<b>0.03</b>	<b>1.00</b>

**7.4 Bacteriological Data: Water Treatment Plants  
2021**

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
<b>March</b>															
Rossdale Raw (MPN/100mL)	32	0	0.0	373	1	1,990	0	0.0	31	1	96	1	30.0	30.0	30.0
E.L. Smith Raw (MPN/100mL)	5	0	0.0	108	12	236	0	0.0	7	1	28	1	32.6	32.6	32.6
<b>Raw River Water Entering the Treatment Plants</b>	<b>37</b>	<b>0</b>	<b>0.0</b>	<b>337</b>	<b>1</b>	<b>1,990</b>	<b>0</b>	<b>0.0</b>	<b>28</b>	<b>1</b>	<b>96</b>	<b>2</b>	<b>31.3</b>	<b>30.0</b>	<b>32.6</b>
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.52	0.03	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.35	0.04	1.00
<b>Water Entering the Plant Reservoir</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.44</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.45	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.45	0.04	1.00
<b>Treated Water Entering the Distribution System</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.45</b>	<b>0.03</b>	<b>1.00</b>
<b>April</b>															
Rossdale Raw (MPN/100mL)	31	0	0.0	76	1	921	0	0.0	9	1	105	1	311	311	311
E.L. Smith Raw (MPN/100mL)	4	0	0.0	18	13	20	0	0.0	1	1	1	1	311	311	311
<b>Raw River Water Entering the Treatment Plants</b>	<b>35</b>	<b>0</b>	<b>0.0</b>	<b>70</b>	<b>1</b>	<b>921</b>	<b>0</b>	<b>0.0</b>	<b>8</b>	<b>1</b>	<b>105</b>	<b>2</b>	<b>311</b>	<b>311</b>	<b>311</b>
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.48	0.02	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.34	0.05	1.00
<b>Water Entering the Plant Reservoir</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.41</b>	<b>0.02</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.60	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.33	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.46</b>	<b>0.03</b>	<b>1.00</b>

**7.4 Bacteriological Data: Water Treatment Plants  
2021**

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
<b>May</b>															
Rossdale Raw (MPN/100mL)	31	0	0.0	506	1	3,230	0	0.0	69	1	980	1	176	176	176
E.L. Smith Raw (MPN/100mL)	4	0	0.0	248	52	649	0	0.0	12	2	34	1	114	114	114
<b>Raw River Water Entering the Treatment Plants</b>	<b>35</b>	<b>0</b>	<b>0.0</b>	<b>477</b>	<b>1</b>	<b>3,230</b>	<b>0</b>	<b>0.0</b>	<b>62</b>	<b>1</b>	<b>980</b>	<b>2</b>	<b>145</b>	<b>114</b>	<b>176</b>
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.54	0.02	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.35	0.02	1.00
<b>Water Entering the Plant Reservoir</b>	<b>61</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>61</b>	<b>0.45</b>	<b>0.02</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.52	0.02	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.50	0.02	1.00
<b>Treated Water Entering the Distribution System</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.51</b>	<b>0.02</b>	<b>1.00</b>
<b>June</b>															
Rossdale Raw (MPN/100mL)	31	0	0.0	519	1	1,730	0	0.0	27	1	105	1	261	261	261
E.L. Smith Raw (MPN/100mL)	6	0	0.0	428	121	1,300	0	0.0	36	4	76	1	268	268	268
<b>Raw River Water Entering the Treatment Plants</b>	<b>37</b>	<b>0</b>	<b>0.0</b>	<b>504</b>	<b>1</b>	<b>1,730</b>	<b>0</b>	<b>0.0</b>	<b>28</b>	<b>1</b>	<b>105</b>	<b>2</b>	<b>265</b>	<b>261</b>	<b>268</b>
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.65	0.02	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.43	0.02	1.00
<b>Water Entering the Plant Reservoir</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.54</b>	<b>0.02</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.50	0.02	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.53	0.02	1.00
<b>Treated Water Entering the Distribution System</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.51</b>	<b>0.02</b>	<b>1.00</b>

**7.4 Bacteriological Data: Water Treatment Plants  
2021**

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
<b>July</b>															
Rossdale Raw (MPN/100mL)	33	0	0.0	1,285	1	5,970	0	0.0	91	1	646	1	38.6	38.6	38.6
E.L. Smith Raw (MPN/100mL)	4	0	0.0	1,089	308	2,420	0	0.0	23	10	60	1	38.5	38.5	38.5
<b>Raw River Water Entering the Treatment Plants</b>	<b>37</b>	<b>0</b>	<b>0.0</b>	<b>1,264</b>	<b>1</b>	<b>5,970</b>	<b>0</b>	<b>0.0</b>	<b>84</b>	<b>1</b>	<b>646</b>	<b>2</b>	<b>38.5</b>	<b>38.5</b>	<b>38.6</b>
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.66	0.03	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.50	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.58</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.68	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.64	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.66</b>	<b>0.03</b>	<b>1.00</b>
<b>August</b>															
Rossdale Raw (MPN/100mL)	32	0	0.0	289	1	980	0	0.0	21	1	74	1	70.4	70.4	70.4
E.L. Smith Raw (MPN/100mL)	4	0	0.0	376	194	517	0	0.0	10	5	23	1	71.3	71.3	71.3
<b>Raw River Water Entering the Treatment Plants</b>	<b>36</b>	<b>0</b>	<b>0.0</b>	<b>299</b>	<b>1</b>	<b>980</b>	<b>0</b>	<b>0.0</b>	<b>20</b>	<b>1</b>	<b>74</b>	<b>2</b>	<b>70.8</b>	<b>70.4</b>	<b>71.3</b>
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.76	0.04	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.71	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.73</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.88	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.62	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.75</b>	<b>0.03</b>	<b>1.00</b>

**7.4 Bacteriological Data: Water Treatment Plants  
2021**

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
<b>September</b>															
Rossdale Raw (MPN/100mL)	30	0	0.0	565	1	4,290	0	0.0	37	1	365	1	58.7	58.7	58.7
E.L. Smith Raw (MPN/100mL)	6	0	0.0	129	12	249	0	0.0	12	2	30	1	19.5	19.5	19.5
<b>Raw River Water Entering the Treatment Plants</b>	<b>36</b>	<b>0</b>	<b>0.0</b>	<b>492</b>	<b>1</b>	<b>4,290</b>	<b>0</b>	<b>0.0</b>	<b>33</b>	<b>1</b>	<b>365</b>	<b>2</b>	<b>39.1</b>	<b>19.5</b>	<b>58.7</b>
Rossdale Treated (PA/100mL)	29	0	0.0				0	0.0				29	0.52	0.03	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.42	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>59</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>59</b>	<b>0.47</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	29	0	0.0				0	0.0				29	0.68	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.43	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.55</b>	<b>0.03</b>	<b>1.00</b>
<b>October</b>															
Rossdale Raw (MPN/100mL)	30	0	0.0	222	47	1,990	0	0.0	12	1	116	1	27.5	27.5	27.5
E.L. Smith Raw (MPN/100mL)	4	0	0.0	152	114	210	0	0.0	5	3	7	1	14.6	14.6	14.6
<b>Raw River Water Entering the Treatment Plants</b>	<b>34</b>	<b>0</b>	<b>0.0</b>	<b>214</b>	<b>47</b>	<b>1,990</b>	<b>0</b>	<b>0.0</b>	<b>11</b>	<b>1</b>	<b>116</b>	<b>2</b>	<b>21.0</b>	<b>14.6</b>	<b>27.5</b>
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.81	0.03	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.61	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.71</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.75	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.61	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.68</b>	<b>0.03</b>	<b>1.00</b>



**7.4 Bacteriological Data: Water Treatment Plants  
2021**

	Coliforms, total						E. coli					cATP (pg/mL)			
	Count	# +ve	% +ve	Mean	Min	Max	# +ve	% +ve	Mean	Min	Max	Count	Mean	Min	Max
<b>November</b>															
Rossdale Raw (MPN/100mL)	31	0	0.0	162	1	866	0	0.0	6	1	44	1	50.7	50.7	50.7
E.L. Smith Raw (MPN/100mL)	4	0	0.0	109	91	116	0	0.0	1	1	2	1	39.8	39.8	39.8
<b>Raw River Water Entering the Treatment Plants</b>	<b>35</b>	<b>0</b>	<b>0.0</b>	<b>156</b>	<b>1</b>	<b>866</b>	<b>0</b>	<b>0.0</b>	<b>5</b>	<b>1</b>	<b>44</b>	<b>2</b>	<b>45.3</b>	<b>39.8</b>	<b>50.7</b>
Rossdale Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.39	0.03	1.00
E.L. Smith Treated (PA/100mL)	30	0	0.0				0	0.0				30	0.29	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.34</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.40	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	30	0	0.0				0	0.0				30	0.22	0.03	1.00
<b>Treated Water Entering the Distribution System</b>	<b>60</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>60</b>	<b>0.31</b>	<b>0.03</b>	<b>1.00</b>
<b>December</b>															
Rossdale Raw (MPN/100mL)	32	0	0.0	99	1	238	0	0.0	7	1	40	1	24.4	24.4	24.4
E.L. Smith Raw (MPN/100mL)	5	0	0.0	90	43	118	0	0.0	1	1	2	1	27.9	27.9	27.9
<b>Raw River Water Entering the Treatment Plants</b>	<b>37</b>	<b>0</b>	<b>0.0</b>	<b>98</b>	<b>1</b>	<b>238</b>	<b>0</b>	<b>0.0</b>	<b>7</b>	<b>1</b>	<b>40</b>	<b>2</b>	<b>26.1</b>	<b>24.4</b>	<b>27.9</b>
Rossdale Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.27	0.03	1.00
E.L. Smith Treated (PA/100mL)	31	0	0.0				0	0.0				31	0.36	0.03	1.00
<b>Water Entering the Plant Reservoir</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.31</b>	<b>0.03</b>	<b>1.00</b>
Rossdale Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.35	0.03	1.00
E.L. Smith Reservoir (PA/100mL)	31	0	0.0				0	0.0				31	0.26	0.04	1.00
<b>Treated Water Entering the Distribution System</b>	<b>62</b>	<b>0</b>	<b>0.0</b>				<b>0</b>	<b>0.0</b>				<b>62</b>	<b>0.31</b>	<b>0.03</b>	<b>1.00</b>

PA = present or absent, MPN = most probable number, cATP = cellular adenosine triphosphate

**7.5 Bacteriological Data: Distribution System  
2021**

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)			
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max
<b>January</b>									
FIELD DISTRIBUTION	108	0	0.0	0	0.0	62	0.15	0.03	0.76
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	53	0	0.0	0	0.0	53	0.15	0.01	0.38
FIELD RESERVOIR - PLPH (duplicate-not counted)	49	0	0.0	0	0.0				
Monthly	221	0	0.0	0	0.0	115	0.15	0.01	0.76
<b>February</b>									
FIELD DISTRIBUTION	111	0	0.0	0	0.0	61	0.17	0.03	1.83
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	57	0	0.0	0	0.0	57	0.26	0.05	5.38
FIELD RESERVOIR - PLPH (duplicate-not counted)	52	0	0.0	0	0.0				
Monthly	228	0	0.0	0	0.0	118	0.20	0.03	5.38
<b>March</b>									
FIELD DISTRIBUTION	110	0	0.0	0	0.0	61	0.15	0.03	0.39
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	69	0	0.0	0	0.0	69	0.19	0.03	0.55
FIELD RESERVOIR - PLPH (duplicate-not counted)	65	0	0.0	0	0.0				
Monthly	239	0	0.0	0	0.0	130	0.18	0.03	0.55
<b>April</b>									
FIELD DISTRIBUTION	97	0	0.0	0	0.0	62	0.08	0.01	0.19
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	58	0	0.0	0	0.0	58	0.13	0.01	0.30
FIELD RESERVOIR - PLPH (duplicate-not counted)	52	0	0.0	0	0.0				
Monthly	215	0	0.0	0	0.0	120	0.10	0.01	0.30

**7.5 Bacteriological Data: Distribution System  
2021**

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)			
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max
<b>May</b>									
FIELD DISTRIBUTION	101	0	0.0	0	0.0	60	0.07	0.02	0.15
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	57	0	0.0	0	0.0	57	0.12	0.02	0.66
FIELD RESERVOIR - PLPH (duplicate-not counted)	52	0	0.0	0	0.0				
Monthly	218	0	0.0	0	0.0	117	0.10	0.02	0.66
<b>June</b>									
FIELD DISTRIBUTION	103	0	0.0	0	0.0	62	0.14	0.03	0.56
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	71	0	0.0	0	0.0	71	0.12	0.03	0.83
FIELD RESERVOIR - PLPH (duplicate-not counted)	65	0	0.0	0	0.0				
Monthly	234	0	0.0	0	0.0	133	0.13	0.03	0.83
<b>July</b>									
FIELD DISTRIBUTION	99	0	0.0	0	0.0	62	0.21	0.03	0.70
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	56	0	0.0	0	0.0	56	0.42	0.03	3.32
FIELD RESERVOIR - PLPH (duplicate-not counted)	52	0	0.0	0	0.0				
Monthly	215	0	0.0	0	0.0	118	0.31	0.03	3.32
<b>August</b>									
FIELD DISTRIBUTION	110	1	0.9	0	0.0	60	0.14	0.03	0.51
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	72	0	0.0	0	0.0	72	0.21	0.02	1.01
FIELD RESERVOIR - PLPH (duplicate-not counted)	65	0	0.0	0	0.0				
Monthly	242	1	0.4	0	0.0	132	0.18	0.02	1.01

**7.5 Bacteriological Data: Distribution System  
2021**

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)			
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max
<b>September</b>									
FIELD DISTRIBUTION	111	1	0.9	0	0.0	62	0.16	0.03	0.61
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	56	0	0.0	0	0.0	56	0.17	0.03	0.80
FIELD RESERVOIR - PLPH (duplicate-not counted)	52	0	0.0	0	0.0				
Monthly	227	1	0.4	0	0.0	118	0.17	0.03	0.80
<b>October</b>									
FIELD DISTRIBUTION	99	1	1.0	0	0.0	60	0.13	0.03	0.35
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	53	0	0.0	0	0.0	53	0.17	0.03	0.76
FIELD RESERVOIR - PLPH (duplicate-not counted)	46	0	0.0	0	0.0				
Monthly	212	1	0.5	0	0.0	113	0.14	0.03	0.76
<b>November</b>									
FIELD DISTRIBUTION	97	0	0.0	0	0.0	60	0.12	0.03	0.28
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	61	0	0.0	0	0.0	61	0.14	0.03	0.34
FIELD RESERVOIR - PLPH (duplicate-not counted)	59	0	0.0	0	0.0				
Monthly	218	0	0.0	0	0.0	121	0.13	0.03	0.34
<b>December</b>									
FIELD DISTRIBUTION	95	0	0.0	0	0.0	61	0.09	0.03	0.49
FIELD DISTRIBUTION - PLPH	60	0	0.0	0	0.0				
FIELD RESERVOIR	48	0	0.0	0	0.0	48	0.12	0.03	0.43
FIELD RESERVOIR - PLPH (duplicate-not counted)	48	0	0.0	0	0.0				
Monthly	203	0	0.0	0	0.0	109	0.11	0.03	0.49
Year to Date	2,672	3	0.1	0	0.0	1,444	0.16	0.01	5.38

## 7.5 Bacteriological Data: Distribution System 2021

### BACTERIOLOGICAL SAMPLING AND TESTING REQUIREMENTS:

Testing for bacteria (Total Coliform and *E.coli*) in the distribution system is an AEP Approval requirement. The approval states that grab samples in the quantity specified in the Guidelines for Canadian Drinking Water Quality be collected at regular intervals throughout the month. For a city the size of Edmonton (population 972,000 in 2019) the guidelines recommend a minimum of 190 bacteriological samples. At least 95 of the 190 samples must be tested at the Provincial Laboratory for Public Health (PLPH) each month according to the Operations Program. The remainder are tested at the EPCOR Water Laboratory (Accredited to ISO/IEC 17025: standard for water quality parameters). Samples collected weekly from the twelve field reservoirs and tested in the EPCOR Water Laboratory are included in the count. Duplicate samples from the twelve field reservoirs are collected on the same day and tested at the Provincial Laboratory for Public Health are not included in the count.

### TABLE DEFINITIONS:

- PLPH - indicates that these tests were conducted by Provincial Laboratory for Public Health (ProvLAB). All other samples were tested at the EPCOR Water Laboratory (accredited to ISO/IEC17025)
- FIELD DISTRIBUTION - includes samples collected from recreation centres, other public facilities, convenience stores, dead end locations and EPCOR employee homes and tested at the EPCOR Water Laboratory.
- FIELD DISTRIBUTION - PLPH - includes samples collected from 30 Edmonton Fire Stations twice monthly and tested at PLPH
- FIELD RESERVOIR - includes weekly samples collected from the thirteen field reservoirs in the distribution system and tested at the EPCOR Water Laboratory
- FIELD RESERVOIR - includes duplicate weekly samples collected from the twelve field reservoirs in the distribution system and tested at PLPH

**7.5 Bacteriological Data: Distribution System  
2021**

	Coliforms, total (PA/100 mL)			E. coli (PA/100 mL)		cATP (pg/mL)				
	Count	# +ve	% +ve	# +ve	% +ve	Count	Mean	Min	Max	
<b>Samples from Complaints</b>										
January	4	0	0.0	0	0.0	4	0.24	0.13	0.29	
February	4	0	0.0	0	0.0	4	0.13	0.12	0.14	
March	4	0	0.0	0	0.0	4	0.11	0.05	0.24	
April	5	0	0.0	0	0.0	5	0.11	0.06	0.14	
May	8	0	0.0	0	0.0	8	0.09	0.03	0.17	
June	15	0	0.0	0	0.0	15	0.33	0.02	2.44	
July	25	0	0.0	0	0.0	25	0.29	0.03	1.10	
August	21	0	0.0	0	0.0	21	0.16	0.03	0.34	
September	11	0	0.0	0	0.0	11	0.15	0.03	0.33	
October	14	0	0.0	0	0.0	14	0.20	0.06	0.45	
November	13	0	0.0	0	0.0	13	0.15	0.04	0.32	
December	10	0	0.0	0	0.0	10	0.54	0.06	2.26	
	Year to Date	134	0	0.0	0	0.0	134	0.22	0.02	2.44
<b>Samples from Depressurizations</b>										
January	53	0	0.0	0	0.0					
February	107	0	0.0	0	0.0					
March	48	0	0.0	0	0.0					
April	44	0	0.0	0	0.0					
May	53	0	0.0	0	0.0					
June	86	0	0.0	0	0.0					
July	69	2	2.9	0	0.0					
August	89	0	0.0	0	0.0					
September	79	0	0.0	0	0.0					
October	96	2	2.1	0	0.0					
November	118	0	0.0	0	0.0					
December	74	0	0.0	0	0.0					
	Year to Date	916	4	0.4	0	0.0				

## 7.6 Giardia and Cryptosporidium

2021

### Treated Water entering the distribution system

	Cryptosporidium		Giardia	
	oocysts/100L		cysts/100L	
	E.L. Smith	Rosssdale	E.L. Smith	Rosssdale
4 - Jan	<0.1		<0.1	
18 - Jan	<0.1		<0.1	
19 - Jan		<0.1		<0.1
1 - Feb		<0.1		<0.1
	<0.1		<0.1	
16 - Feb		<0.1		<0.1
	<0.1		<0.1	
1 - Mar		<0.1		<0.1
	<0.1		<0.1	
8 - Mar		<0.1		<0.1
9 - Mar	<0.1		<0.1	
15 - Mar		<0.1		<0.1
	<0.1		<0.1	
22 - Mar		<0.1		<0.1
	<0.1		<0.1	
31 - Mar	<0.1		<0.1	
		<0.1		<0.1
6 - Apr		<0.1		<0.1
	<0.1		<0.1	
10 - May	<0.1		<0.1	
11 - May		<0.1		<0.1
8 - Jun		<0.1		<0.1
14 - Jun	<0.1		<0.1	
12 - Jul	<0.1		<0.1	
13 - Jul		<0.1		<0.1
4 - Aug		<0.1		<0.1
9 - Aug	<0.1		<0.1	
13 - Sep		<0.1		<0.1
14 - Sep	<0.1		<0.1	
20 - Sep		<0.1		<0.1
21 - Sep	<0.1		<0.1	
27 - Sep		<0.1		<0.1
28 - Sep	<0.1		<0.1	
4 - Oct		<0.1		<0.1
	<0.1		<0.1	
12 - Oct		<0.1		0.1
13 - Oct	<0.1		<0.1	
25 - Oct		<0.1		<0.1
26 - Oct	<0.1		<0.1	
1 - Nov		<0.1		<0.1
	<0.1		<0.1	
15 - Nov		<0.1		<0.1
16 - Nov	<0.1		<0.1	
29 - Nov		<0.1		<0.1
	<0.1		<0.1	
13 - Dec	<0.1		<0.1	
14 - Dec		<0.1		<0.1

## 7.6 Giardia and Cryptosporidium

2021

### Water entering plant reservoir

	<b>Cryptosporidium oocysts/100L Rossdale</b>	<b>Giardia cysts/100L Rossdale</b>
<b>1 - Feb</b>	<0.1	<0.1
<b>6 - Apr</b>	<0.1	<0.1
<b>13 - Sep</b>	<0.1	<0.1
<b>29 - Nov</b>	<0.1	<0.1



## 7.6 Giardia and Cryptosporidium

2021

### Raw Water

	Cryptosporidium		Giardia	
	oocysts/100L		cysts/100L	
	E.L. Smith	Rossdale	E.L. Smith	Rossdale
4 - Jan	<1.0		1.0	
5 - Jan		<0.1		<0.1
		<1.0		1.0
18 - Jan	<0.8		<0.8	
19 - Jan		<0.7		<0.7
1 - Feb		<1.0		<1.0
	<1.1		<1.1	
16 - Feb		<0.8		<0.8
	<1.0		<1.0	
1 - Mar		<0.9		<0.9
	<1.0		<1.0	
8 - Mar		<0.9		<0.9
9 - Mar	<0.9		<0.9	
15 - Mar		<0.8		<0.8
	<1.1		<1.1	
22 - Mar		<1.8		<1.8
	<1.9		<1.9	
31 - Mar	<1.3		<1.3	
		<1.1		<1.1
6 - Apr		<1.5		<1.5
	<1.9		<1.9	
10 - May	<1.8		3.5	
11 - May		<6.8		<6.8
9 - Jun		<7.5		<7.5
14 - Jun	<9.4		38.0	
12 - Jul	<12.0		35.0	
13 - Jul		2.9		2.9
9 - Aug	1.9		14.0	
10 - Aug		2.6		13.0
13 - Sep		<3.7		11.0
14 - Sep	<2.5		<2.5	
20 - Sep		6.0		32.0
21 - Sep	9.7		19.0	
27 - Sep		10.0		90.0
28 - Sep	12.0		16.0	
4 - Oct		2.7		73.0
	3.8		66.0	
12 - Oct		5.3		71.0
13 - Oct	16.0		170.0	
25 - Oct		9.3		47.0
26 - Oct	<2.4		70.0	
1 - Nov		4.5		150.0
	<3.2		42.0	
15 - Nov		14.0		600.0
16 - Nov	8.2		160.0	
29 - Nov		<2.1		17.0
	<3.8		19.0	
13 - Dec	<1.9		1.9	
14 - Dec		1.8		18.0

**7.7 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic**

**2021**

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Microbiologicals</b>										
Microcystin	<0.10	<0.10	0.14	12	<0.1	<0.1	0.1	12	1.5	
<b>Physical</b>										
Colour (TCU)	0.8	<0.5	2.3	363	0.8	<0.5	2.4	365	(15)	10
Conductivity (uS/cm)	366	314	440	52	371	315	455	53	(<1)	<1
FPA-Intensity (N/A)	0.72	0.38	1.12	64	0.64	0.38	1.12	64		
pH (N/A)	7.9	7.4	8.2	363	7.8	7.4	8.2	365	(7.0 - 10.5)	7.3-8.3
Total Dissolved Solids (mg/L)	219	189	267	12	223	179	272	12	(500)	
Turbidity (NTU)	0.04	<0.02	0.12	363	0.05	<0.02	0.17	365		0.3
<b>Primary Inorganics (mg/L)</b>										
Aluminum	0.089	0.030	0.179	12	0.086	0.029	0.172	12	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	0.0003	12	<0.0002	<0.0002	<0.0002	12	0.006	
Arsenic	<0.0002	<0.0002	0.0003	12	<0.0002	<0.0002	<0.0002	12	0.01	
Barium	0.059	0.050	0.073	12	0.059	0.049	0.073	12	2	
Boron	0.009	0.007	0.012	12	0.008	0.007	0.012	12	5	
Bromate Dissolved	<0.005	<0.005	<0.005	55	<0.005	<0.005	<0.005	56	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12	0.005	
Chlorate Dissolved	0.15	0.06	0.20	55	0.09	0.05	0.14	56	1	
Chlorite Dissolved	<0.005	<0.005	<0.005	55	<0.005	<0.005	<0.005	56	1	
Chromium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12	0.05	
Copper	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	(1)	
Cyanide Dissolved	<0.002	<0.002	<0.002	12	<0.002	<0.002	<0.002	12	0.2	
Fluoride	0.68	0.56	0.72	363	0.66	0.55	0.71	365	1.5	0.6-0.8
Lead	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12	0.005	
Manganese	<0.002	<0.002	<0.002	12	<0.002	<0.002	<0.002	12	0.12 (0.02)	
Mercury	<0.0002	<0.00001	<0.0002	16	<0.0002	<0.00001	<0.0002	16	0.001	
Nitrate (as N) Dissolved	0.07	0.03	0.18	55	0.07	0.03	0.14	56	10	
Nitrite (as N) Dissolved	0.02	<0.01	0.05	55	0.03	<0.01	0.05	56	1	
Selenium	<0.0002	<0.0002	0.0003	12	0.0002	<0.0002	0.0003	12	0.05	
Total Chlorine	2.10	1.44	2.49	363	1.99	1.73	2.18	365	>1.0	>1.0 and <2.4
Uranium	<0.0005	<0.0005	0.0006	12	<0.0005	<0.0005	0.0006	12	0.02	

**7.7 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic**

**2021**

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Primary Organics (ug/L)</b>										
2,4-D	<10	<10	<10	4	<10	<10	<10	4	100	
Atrazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	5	
Benzene	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	5	
Benzo(a)pyrene	<0.005	<0.005	<0.005	4	<0.005	<0.005	<0.005	4	0.04	
Bromoxynil	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4	5	
Carbon Tetrachloride	<1.0	<0.5	<1.0	366	<1.0	<0.5	<1.0	368	2	
Chlorobenzene	<0.4946	<0.0005	<0.5000	369	<0.4946	<0.0005	<0.5000	371	80 (30)	
Chlorpyrifos	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	90	
Cyanazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Diazinon	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	20	
Dicamba	<12	<12	<12	4	<12	<12	<12	4	120	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	2	5	
Dichloroethylene (1,1)	<3	<3	<3	365	<3	<3	<3	367	14	
Dichlorophenol (2,4)	<0.3	<0.3	<0.3	4	<0.3	<0.3	<0.3	4	900 (0.3)	
Diclofop-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	9	
Dimethoate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	20	
Diuron	<1	<1	<1	4	<1	<1	<1	4	150	
Ethylbenzene	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	140 (1.6)	
Glyphosate	<2.51	<0.01	<5.00	4	<2.51	<0.01	<5.00	4	280	
Haloacetic Acids, (HAA5)	17.6	11.8	27.4	12	15.4	9.6	24.8	12	80	40
Haloacetic Acids, total (HAA6)	17.8	11.9	27.9	12	15.6	9.7	25.2	12		
Malathion	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	190	
MCPA	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4	100	
Methylene Chloride	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	50	
Metolachlor	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	50	
Metribuzin	<1	<1	<1	4	<1	<1	<1	4	80	
NDMA	<0.0022	<0.0009	<0.0090	14	<0.0021	<0.0009	<0.0090	14	0.040	10
NTA (mg/L)	<0.2	<0.2	<0.2	4	<0.2	<0.2	<0.2	4	0.4	
Pentachlorophenol	<6	<6	<6	4	<6	<6	<6	4	60 (30)	
Perfluorooctane sulfonic acid (PFOS)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4	0.6	
Perfluorooctanoic acid (PFOA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4	0.0002	
Phorate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	2	
Picloram	<19	<19	<19	4	<19	<19	<19	4	190	
Simazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	10	
Terbufos	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	1	
Tetrachloroethylene	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	368	10	
Toluene	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	60 (24)	
Total Xylenes	<2.5	<2.5	<2.5	329	<2.5	<2.5	<2.5	331	90	
Trichloroethylene	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	368	5	
Trifluralin	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4	45	
Trihalomethanes	13.7	4.4	36.9	366	11.6	3.5	32.6	368	100	50
Vinyl Chloride	<0.3339	<0.0005	<1.0000	6	<0.3339	<0.0005	<1.0000	6	2	

## 7.7 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic

2021

	ROSSDALE				E.L. SMITH				Limits	
									*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count		
<b>Radionuclides (Bq/L)</b>										
Cesium-137	<0.2	<0.2	<0.2	2	<0.09	<0.08	<0.10	2	10	
Gross Alpha	<0.11	<0.09	<0.13	2	<0.12	<0.09	<0.14	2	(0.5)	
Gross Beta	<0.07	<0.06	<0.07	2	<0.07	<0.07	0.07	2	(1.0)	
Iodine-131	<0.5	<0.5	<0.5	2	<0.5	<0.4	<0.5	2	6	
Lead-210	<0.02	<0.02	<0.02	2	<0.02	<0.02	<0.02	2	0.2	
Radium-226	<0.005	<0.005	<0.005	2	<0.006	<0.005	0.007	2	0.5	
Strontium-90	<0.05	<0.05	<0.05	2	<0.05	<0.05	<0.05	2	5	
Tritium	<28	<15	<40	2	<28	<15	<40	2	7000	
<b>Secondary Inorganics (mg/L)</b>										
Alkalinity Total (mg CaCO3/L)	120	99	145	363	121	96	145	365		
Ammonia as NH3	0.12	0.06	0.20	67	0.11	<0.05	0.16	68		
Beryllium	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12		
Bromide Dissolved	0.02	<0.01	0.08	55	0.03	<0.01	0.11	56		
Calcium	46.3	40.6	54.9	12	46.7	41.3	56.5	12		
Chloride Dissolved	5.6	3.0	10.8	55	5.8	4.8	8.1	56	(250)	
Chlorine Free	<0.03	<0.03	<0.03	16	<0.03	<0.03	<0.03	16		
Cobalt	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12		
Hardness, Ca (mg CaCO3/L)	111	91	134	363	110	87	132	365		
Hardness, Total (mg CaCO3/L)	170	137	203	363	169	143	201	365		
Iron	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	12	<0.001	<0.001	<0.001	12		
Lithium	0.0033	0.0029	0.0040	12	0.0031	0.0026	0.0036	12		
Magnesium	14.0	12.2	16.2	12	14.1	12.1	16.7	12		
Molybdenum	0.0007	0.0006	0.0008	12	0.0007	0.0006	0.0008	12		
Nickel	<0.0005	<0.0005	0.0006	12	<0.0005	<0.0005	0.0007	12		
Phosphate, Ortho (as P)	<0.02	<0.02	<0.02	12	<0.02	<0.02	<0.02	12		
Phosphorus	<0.02	<0.02	<0.02	12	<0.02	<0.02	<0.02	12		
Potassium	0.7	0.6	1.0	12	0.7	0.6	0.9	12		
Silicon	1.87	1.39	2.56	12	1.86	1.42	2.51	12		
Silver	<0.0002	<0.0002	<0.0002	12	<0.0002	<0.0002	<0.0002	12		
Sodium	8.1	5.7	16.8	12	10.2	6.9	23.9	12	(200)	
Strontium	0.423	0.356	0.463	12	0.423	0.357	0.457	12		
Sulphate Dissolved	57.3	49.8	84.9	55	59.2	48.8	95.1	56	(500)	
Sulphide	<0.002	<0.002	<0.002	12	<0.002	<0.002	<0.002	12	(0.05)	
Thallium	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Tin	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Titanium	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Vanadium	<0.0005	<0.0005	<0.0005	12	<0.0005	<0.0005	<0.0005	12		
Zinc	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	(5.0)	
Zirconium	<0.001	<0.001	<0.001	12	<0.001	<0.001	<0.001	12		

## 7.7 Treated Water Entering the Distribution System: Physical, Inorganic, and Organic

2021

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Secondary Organics (ug/L)										
Aldicarb	<0.9	<0.9	<0.9	4	<0.9	<0.9	<0.9	4		
Aldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4		
Azinphos-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Bromochloroacetic acid	<1	<1	<1	12	<1	<1	<1	12		
Bromodichloromethane	<0.5	<0.5	2.6	366	<0.5	<0.5	2.1	368		16
Bromoform	<1.0	<0.5	<1.0	366	<1.0	<0.5	<1.0	368		
Carbaryl	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4	90	
Carbofuran	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4	90	
Chloroform	13.5	<0.01	35.8	370	11.5	<0.01	32.6	372		
Dibromoacetic acid	<1	<1	<1	12	<1	<1	<1	12		
Dibromochloromethane	<0.4947	<0.0005	<0.5000	370	<0.4947	<0.0005	<0.5000	372		
Dichloroacetic acid	7.3	4.3	11.7	12	6.8	3.5	11.3	12		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Dieldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	(15)	
MIBK	<1	<1	<1	365	<1	<1	<1	367		
Monobromoacetic acid	<1	<1	<1	12	<1	<1	<1	12		
Monochloroacetic acid	<5	<5	<5	12	<5	<5	<5	12		
Parathion	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Perfluorobutanoic acid (PFBA)	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Perfluorohexane sulfonic acid (PFHxS)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4		
Perfluorohexanoic acid (PFHxA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4		
Perfluorononanoic acid (PFNA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4		
Perfluoropentanoic acid (PFPeA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4		
Styrene	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Tetrachloroethane (1,1,2,2)	<1.0	<0.5	<1.0	366	<1.0	<0.5	<1.0	368		
Total Organic Carbon	1.3	0.8	3.0	52	1.2	0.7	2.6	53		
Total Volatile Organics (NonTHM)	<1	<1	<1	365	<1	<1	<1	367		
Total Volatile Organics (Unknown)	<1	<1	<1	363	<1	<1	<1	365		
Triallate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4		
Trichloroacetic acid	8.2	5.3	14.1	12	7.0	4.1	11.3	12		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	368		
Xylene (1,2)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Xylene (1,4)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		

TABLE EXPLANATIONS:

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

**7.8 ROSSDALE AND E.L. SMITH TREATED WATER ENTERING PLANT RESERVOIR**

**2021**

	ROSSDALE				E.L. SMITH				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Physical</b>										
FPA-Intensity (N/A)	0.70	0.38	1.06	15	0.55	0.31	1.00	14		
Turbidity (NTU)	<0.04	<0.03	0.09	362	0.05	<0.03	0.11	364		0.3
UV 254 %T ****	<95.2	<89.2	<97.8	363	<95.4	<90.1	<97.7	365		
<b>Primary Inorganics (mg/L)</b>										
Bromate Dissolved	<0.005	<0.005	<0.005	55	<0.005	<0.005	<0.005	55	0.01	
Chlorate Dissolved	0.15	0.06	0.20	55	0.09	0.05	0.15	55	1	
Chlorite Dissolved	<0.005	<0.005	<0.005	55	<0.005	<0.005	<0.005	55	1	
Nitrate (as N) Dissolved	0.07	0.03	0.17	55	0.07	0.03	0.14	55	10	
Nitrite (as N) Dissolved	0.02	<0.01	0.05	55	0.02	<0.01	0.05	55	1	
<b>Primary Organics (ug/L)</b>										
Benzene	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	5	
Carbon Tetrachloride	<1.0	<0.5	<1.0	365	<1.0	<0.5	<1.0	367	2	
Chlorobenzene	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	80 (30)	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	2	5	
Dichloroethylene (1,1)	<3	<3	<3	364	<3	<3	<3	366	14	
Ethylbenzene	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	10	
Toluene	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	60 (24)	
Total Xylenes	<2.5	<2.5	<2.5	328	<2.5	<2.5	<2.5	330	90	
Trichloroethylene	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367	5	
Trihalomethanes	12.1	3.8	32.1	365	9.0	2.6	25.5	367	100	50
Vinyl Chloride	<1	<1	<1	2	<1	<1	<1	2	2	
<b>Secondary Inorganics (mg/L)</b>										
Ammonia as NH3	0.12	0.05	0.21	67	0.10	<0.05	0.16	67		
Bromide Dissolved	0.03	<0.01	0.11	55	0.03	<0.01	0.11	55		
Chloride Dissolved	5.8	2.8	15.0	55	5.8	4.5	8.0	55	(250)	
Sulphate Dissolved	57.4	49.4	85.2	55	59.2	48.4	93.9	55	(500)	
<b>Secondary Organics (ug/L)</b>										
Bromodichloromethane	<0.5	<0.5	2.6	365	<0.5	<0.5	2.0	367		16
Bromoform	<1.0	<0.5	<1.0	365	<1.0	<0.5	<1.0	367		
Chloroform	12.0	3.80	32.1	365	9.0	2.60	25.5	367		
Dibromochloromethane	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366	(15)	
MIBK	<1	<1	<1	364	<1	<1	<1	366		
Styrene	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Tetrachloroethane (1,1,2,2)	<1.0	<0.5	<1.0	365	<1.0	<0.5	<1.0	367		
Total Volatile Organics (NonTHM)	<1	<1	<1	364	<1	<1	<1	366		
Total Volatile Organics (Unknown)	<1	<1	<1	362	<1	<1	<1	364		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	365	<0.5	<0.5	<0.5	367		
Xylene (1,2)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		
Xylene (1,4)	<0.5	<0.5	<0.5	364	<0.5	<0.5	<0.5	366		

TABLE EXPLANATIONS:

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval Limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according to the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives
- \*\*\*\* UV 254 %T for Rossdale based on a sample collected daily from one of the nine filters selected randomly. For E.L. Smith it is based on a daily sample of Combined Filter Effluent



### 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Microbiologicals</b>						
Microcystin	<0.10	<0.10	<0.10	6	1.5	
<b>Physical</b>						
Colour (TCU)	1.6	<0.5	4.4	4	(15)	10
pH (N/A)	7.9	7.8	8.1	28	(7.0 - 10.5)	7.3 - 8.3
Total Dissolved Solids (mg/L)	213	206	216	4	(500)	
Turbidity (NTU)	0.13	<0.03	3.25	1977		1.0
UV 254 %T	<93.6	<92.3	<95.2	4		
<b>Primary Inorganics (mg/L) **</b>						
Aluminum	0.075	0.031	0.098	4	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	4	0.006	
Arsenic	<0.0002	<0.0002	<0.0002	4	0.01	
Barium	0.058	0.053	0.064	4	2	
Boron	0.009	0.008	0.010	4	5	
Bromate Dissolved	<0.005	<0.005	<0.005	33	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	4	0.005	
Chlorate Dissolved	0.113	0.070	0.172	33	1	
Chlorine, total	1.74	0.77	2.19	1983	>0.5 and <3.0	>1.0 and <2.4
Chlorite Dissolved	<0.005	<0.005	<0.005	33	1	
Chromium	<0.0002	<0.0002	<0.0002	4	0.05	
Copper	<0.005	<0.005	<0.005	4	(1)	
Cyanide Dissolved	<0.002	<0.002	<0.002	4	0.2	
Fluoride	0.68	0.66	0.69	4	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	4	0.005	
Manganese	<0.002	<0.002	<0.002	4	0.12 (0.02)	
Mercury	<0.0001	<0.000005	<0.0002	8	0.001	
Nitrate (as N) Dissolved	0.085	0.060	0.144	33	10	
Nitrite (as N) Dissolved	0.026	<0.010	0.050	33	1	
Selenium	0.0003	<0.0002	0.0003	4	0.05	
Strontium	0.428	0.417	0.448	4	7.0	
Uranium	0.0005	<0.0005	0.0006	4	0.02	

## 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Primary Organics (ug/L) **</b>						
2,4-D	<10.000	<10.000	<10.000	4	100	
Atrazine	<0.100	<0.100	<0.100	4	5	
Atrazine+N-Dealkylated Metabolites	<0.2	<0.2	<0.2	4	0.005	
Azinphos-methyl	<0.1	<0.1	<0.1	4	0.02	
Benzene	<0.50	<0.50	<0.50	78	5	
Benzo(a)pyrene	<0.005	<0.005	<0.005	4	0.04	
Bromoxynil	<0.500	<0.500	<0.500	4	5	
Carbon Tetrachloride	<0.95	<0.0005	<1.00	82	2	
Chlorobenzene	<0.476	<0.001	<0.500	82	80 (30)	
Chlorpyrifos	<0.100	<0.100	<0.100	4	90	
Cyanazine	<0.100	<0.100	<0.100	4		
Diazinon	<0.100	<0.100	<0.100	4	20	
Dicamba	<12.000	<12.000	<12.000	4	120	
Dichlorobenzene (1,2)	<0.4756	<0.0005	<0.5000	82	200 (3)	
Dichlorobenzene (1,4)	<0.476	<0.001	<0.500	82	5 (1)	
Dichloroethane (1,2)	<0.001	<0.001	<0.001	4	5	
Dichloroethene (1,1)	<0.001	<0.001	<0.001	4	14	
Dichloroethylene (1,1)	<3.0	<3.0	<3.0	78	14	
Dichlorophenol(2,4)	<0.30	<0.30	<0.30	4	900 (0.3)	
Diclofop-methyl	<0.10	<0.10	<0.10	4	9	
Dimethoate	<0.100	<0.100	<0.100	4	20	
Diquat	<1	<1	<1	4	0.07	
Diuron	<1.0	<1.0	<1.0	4	150	
Ethylbenzene	<0.50	<0.50	<0.50	78	140 (1.6)	
Glyphosate	<0.01	<0.01	<0.01	4	280	
Malathion	<0.100	<0.100	<0.100	4	190	
MCPA	0.835	<0.500	1.840	4	100	
Methylene Chloride	<0.50	<0.50	<0.50	78	50	
Metolachlor	<0.100	<0.100	<0.100	4	50	
Metribuzin	<1.000	<1.000	<1.000	4	80	
Nitrioltriacetic acid	<0.20	<0.20	<0.20	4	0.4	
Paraquat	<1	<1	<1	4	0.07	
Pentachlorophenol	<6.0	<6.0	<6.0	4	60 (30)	
Perfluorooctane sulfonic acid (PFOS)	<0.01	<0.01	<0.01	4	0.0006	
Perfluorooctanoic acid (PFOA)	<0.01	<0.01	<0.01	4	0.0002	

### 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Primary Organics (ug/L) **</b>						
Phorate	<0.100	<0.100	<0.100	4	0.002	
Picloram	<19.000	<19.000	<19.000	4	190	
Simazine	<0.100	<0.100	<0.100	4	10	
Terbufos	<0.10	<0.10	<0.10	4	1	
Tetrachloroethene	<0.001	<0.001	<0.001	4	0.01	
Tetrachloroethylene	<0.50	<0.50	<0.50	78	10	
Tetrachlorophenol(2,3,4,6)	<1	<1	<1	4	100 (1)	
Toluene	<0.50	<0.50	<0.50	78	60 (24)	
Total Xylenes	<3	<3	<3	72	90	
Trichloroethene	<0.001	<0.001	<0.001	4	0.005	
Trichloroethylene	<0.50	<0.50	<0.50	78	5	
Trichlorophenol(2,4,6)	<0.5	<0.5	<0.5	4	5 (2)	
Trifluralin	<0.100	<0.100	<0.100	4	45	

### 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Secondary Inorganics (mg/L) ***</b>						
Alkalinity Total	124	120	135	4		
Alkalinity, PHP (mg CaCO3/L)	<1	<1	<1	4		
Ammonia as N	0.14	0.11	0.16	29		
Beryllium	<0.0002	<0.0002	<0.0002	4		
Bromide Dissolved	0.025	<0.010	0.080	33		
Calcium	46.7	44.3	48.5	4		
Chloride Dissolved	6.0	3.7	7.6	33	(250)	
Chlorine Free	<0.030	<0.030	<0.030	4		
Cobalt	<0.0002	<0.0002	<0.0002	4		
Hardness, Total (mg CaCO3/L)	173	163	181	4		
Iron	<0.005	<0.005	<0.005	4	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	4		
Lithium	0.0034	0.0032	0.0036	4		
Magnesium	14.0	13.6	14.5	4		
Molybdenum	0.0007	0.0007	0.0008	4		
Nickel	<0.0005	<0.0005	<0.0005	4		
Phosphorus	<0.02	<0.02	<0.02	4		
Potassium	0.93	0.70	1.40	4		
Silicon	1.94	1.55	2.44	4		
Silver	<0.0002	<0.0002	<0.0002	4		
Sodium	9.5	7.3	12.9	4	(200)	
Sulphate Dissolved	59	51	79	33	(500)	
Sulphide	<0.002	<0.002	<0.002	4	(0.05)	
Thallium	<0.0005	<0.0005	<0.0005	4		
Tin	<0.0005	<0.0005	<0.0005	4		
Titanium	<0.0005	<0.0005	<0.0005	4		
Total Kjeldahl Nitrogen	0.58	0.50	0.70	4		
Vanadium	<0.0005	<0.0005	<0.0005	4		
Zinc	<0.005	<0.005	<0.005	4	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	4		

### 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Secondary Organics (ug/L) ***</b>						
2,4,5-T	<28	<28	<28	4		
6:2 Fluorotelomer sulfonic acid(6:2 FTS)	<0.01	<0.01	<0.01	4		
8:2 Fluorotelomer sulfonic acid(8:2 FTS)	<0.01	<0.01	<0.01	4		
a-chlordane	<0.031	<0.008	<0.100	4		
Alachlor	<0.1	<0.1	<0.1	4		
Aldicarb	<0.9	<0.9	<0.9	4		
Aldrin	<0.031	<0.008	<0.100	4		
Ametryn	<0.1	<0.1	<0.1	4		
Atrazine Desethyl	<0.1	<0.1	<0.1	4		
Bendiocarb	<1	<1	<1	4		
Bromochloroacetic acid	<1	<1	<1	76		
Bromodichloromethane	<0.5	<0.5	<0.5	78		16
Bromoform	<1.0	<1.0	<1.0	78		
Carbaryl	<0.500	<0.500	<0.500	4	90	
Carbofuran	<0.500	<0.500	<0.500	4	90	
Chloroform	15.5	<0.01	37.0	82		
Dibromoacetic acid	<1	<1	<1	76		
Dibromochloromethane	<0.48	<0.01	<0.50	82		
Dichloroacetic acid	9	5	19	76		
Dichlorobenzene (1,3)	<0.50	<0.50	<0.50	78		
Dichloroethylene, cis (1,2)	<0.50	<0.50	<0.50	78		
Dichloroethylene, trans (1,2)	<0.50	<0.50	<0.50	78		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	78		
Dieldrin	<0.031	<0.008	<0.100	4		
Dinoseb	<1	<1	<1	4		
gamma-hexachlorocyclohexane	<0.031	<0.008	<0.100	4		
g-chlordane	<0.031	<0.008	<0.100	4		
Heptachlor	<0.031	<0.008	<0.100	4		
Heptachlor Epoxide	<0.031	<0.008	<0.100	4		
Methoxychlor	<67.5	<0.1	<90.0	4		
Methyl Parathion	<0.1	<0.1	<0.1	4		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	78	(15)	
Methylene chloride	<0.01	<0.01	<0.01	4		
MIBK	<1.0	<1.0	<1.0	78		
Monobromoacetic acid	<1	<1	<1	76		

### 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Secondary Organics (ug/L) ***</b>						
Monochloroacetic acid	<5	<5	<5	76		
op-DDT	<0.028	<0.004	<0.100	4		
Oxychlorodane	<0.031	<0.008	<0.100	4		
Parathion	<0.100	<0.100	<0.100	4		
Perfluorobutane sulfonic acid (PFBS)	<0.01	<0.01	<0.02	4		
Perfluorobutanoic acid (PFBA)	<0.275	<0.100	<0.800	4		
Perfluoroheptanoic acid (PFHpA)	<0.01	<0.01	<0.02	4		
Perfluorohexane sulfonic acid (PFHxS)	<0.01	<0.01	<0.02	4		
Perfluorohexanoic acid (PFHxA)	<0.01	<0.01	<0.02	4		
Perfluorononanoic acid (PFNA)	<0.01	<0.01	<0.02	4		
Perfluoropentanoic acid (PFPeA)	<0.01	<0.01	<0.02	4		
pp-DDD	<0.028	<0.004	<0.100	4		
pp-DDE	<0.028	<0.004	<0.100	4		
pp-DDT	<0.028	<0.004	<0.100	4		
Prometon	<0.1	<0.1	<0.1	4		
Prometryne	<0.1	<0.1	<0.1	4		
Propazine	<0.1	<0.1	<0.1	4		
Styrene	<0.50	<0.50	<0.50	78		
Temephos	<1	<1	<1	4		
Terbutryn	<0.1	<0.1	<0.1	4		
Tetrachloroethane (1,1,2,2)	<1.0	<1.0	<1.0	78		
Total Organic Carbon	1.3	1.0	1.5	4		
Total Volatile Organics (NonTHM)	<1.0	<1.0	<1.0	78		
Total Volatile Organics (Unknown)	<1.0	<1.0	<1.0	78		
Triallate	<0.100	<0.100	<0.100	4		
Trichloroacetic acid	8	4	16	76		
Trichlorobenzene (1,2,4)	<0.500	<0.500	<0.500	78		
Trichlorobenzene(1,2,3)	<0.001	<0.001	<0.001	4		
Trichlorobenzene(1,2,4)	<0.001	<0.001	<0.001	4		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	78		
Xylene (1,2)	<0.5	<0.5	<0.5	78		
Xylene (1,4)	<0.5	<0.5	<0.5	78		

## 7.9.a Routine Distribution System (does not include Field Reservoirs)

2021

### TABLE EXPLANATIONS:

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

### Schedule 4 Testing:

- As per AEP Approval 638-04-00 requirements 2 grab samples were collected from two location in the distribution system between December and February (sampled February 8, 2021) and June to August (sampled July 12, 2021) and tested for all Schedule 4 parameters. Two additional samples were collected from two locations in the distribution system (on April 1, 2021 and October 4, 2021) and tested for all Schedule 4 parameters.

### Microcystin Testing:

- As per AEP Approval 638-04-00, one sample was collected from the distribution system between August 1 and 16 (sampled August 4, 2021) and between September 1 and September 16 (sampled Sept 9, 2021) and tested for total microcystin.

**7.9.b Additional Distribution System Samples Collected from Water Quality Complaint Investigations**

2021

	Mean Min Max Count				Limits	
					*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Physical</b>						
Colour (TCU)	0.9	<0.5	5.7	138	(15)	10
pH (N/A)	7.9	7.5	8.2	126	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.49	<0.04	8.55	138		1.0
<b>Primary Inorganics (mg/L) **</b>						
Aluminum	0.096	0.027	0.260	135	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	135	0.006	
Arsenic	<0.0002	<0.0002	<0.0002	135	0.01	
Barium	0.057	0.032	0.074	135	2	
Boron	0.009	0.006	0.015	135	5	
Cadmium	<0.0002	<0.0002	<0.0002	135	0.005	
Chlorine, total	1.69	0.56	2.09	138	>0.5 and <3.0	>1.0 and <2.4
Chromium	0.0002	<0.0002	0.0003	135	0.05	
Copper	0.007	<0.005	0.042	135	(1)	
Lead	0.0011	<0.0002	0.0761	135	0.005	
Manganese	0.002	<0.002	0.013	135	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	135	0.001	
Selenium	0.0002	<0.0002	0.0004	135	0.05	
Strontium	0.422	0.265	0.494	135	7.0	
Uranium	0.0005	<0.0005	0.0006	135	0.02	
<b>Primary Organics (ug/L) **</b>						
Benzene	<0.5	<0.5	<0.5	132	5	
Carbon Tetrachloride	<1.0	<0.5	<1.0	132	2	
Chlorobenzene	<0.5	<0.5	<0.5	132	80 (30)	
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	132	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	132	5 (1)	
Dichloroethane (1,2)	<0.5	<0.5	<0.5	3	5	
Dichloroethylene (1,1)	<3	<3	<3	132	14	
Ethylbenzene	<0.5	<0.5	<0.5	132	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	132	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	132	10	
Toluene	<0.5	<0.5	<0.5	132	60 (24)	
Total Xylenes	<2.5	<2.5	<2.5	128	90	
Trichloroethylene	<0.5	<0.5	<0.5	132	5	
Vinyl Chloride	<1	<1	<1	3	2	



**7.9.b Additional Distribution System Samples Collected from Water Quality Complaint Investigations**

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Secondary Inorganics (mg/L) ***</b>						
Beryllium	<0.0002	<0.0002	<0.0002	135		
Calcium	44.5	27.9	51.9	109		
Cobalt	0.0002	<0.0002	0.0003	135		
Hardness, Total (mg CaCO3/L)	166	103	192	128		
Iron	0.065	<0.005	1.080	135	(0.3)	0.3
Lanthanum	<0.001	<0.001	<0.001	135		
Lithium	0.0032	0.0020	0.0044	135		
Magnesium	13.7	8.7	15.8	109		
Molybdenum	0.0007	0.0005	0.0009	135		
Nickel	0.0005	<0.0005	0.0012	135		
Phosphorus	<0.02	<0.02	<0.02	109		
Potassium	0.7	0.5	1.1	109		
Silicon	1.91	1.43	2.59	109		
Silver	<0.0002	<0.0002	<0.0002	135		
Sodium	8.3	5.6	36.5	109	(200)	
Thallium	<0.0005	<0.0005	<0.0005	135		
Tin	0.0005	<0.0005	0.0039	135		
Titanium	0.0005	<0.0005	0.0021	135		
Vanadium	<0.0005	<0.0005	<0.0005	135		
Zinc	0.006	<0.005	0.026	135	(5.0)	
Zirconium	<0.001	<0.001	<0.001	135		

## 7.9.b Additional Distribution System Samples Collected from Water Quality Complaint Investigations

2021

					Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Secondary Organics (ug/L) ***</b>						
Bromodichloromethane	0.6	<0.5	2.2	132		16
Bromoform	<1.0	<0.5	<1.0	132		
Chloroform	16.1	5.2	35.5	132		
Dibromochloromethane	<0.5	<0.5	<0.5	132		
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	132		
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	132		
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	132		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	132		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	132	(15)	
MIBK	<1	<1	<1	132		
Styrene	<0.5	<0.5	<0.5	132		
Tetrachloroethane (1,1,2,2)	<1.0	<0.5	<1.0	132		
Total Volatile Organics (NonTHM)	<1	<1	<1	132		
Total Volatile Organics (Unknown)	1.1	<1.0	10.2	129		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	132		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	132		
Xylene (1,2)	<0.5	<0.5	<0.5	132		
Xylene (1,4)	<0.5	<0.5	<0.5	132		

### TABLE EXPLANATIONS:

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval Limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according to the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

**7.10 Castledowns, Clareview and Discovery Park Reservoirs  
2021**

Parameter	Castledowns				Clareview				Discovery Park				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Field Chlorine				0				0	1	1	2	15		
Field Turbidity				0				0	1	1	1	1		
<b>Physical</b>														
Colour (TCU)	1.0	<0.5	1.5	7	0.9	<0.5	1.8	10	0.8	<0.5	1.3	6	(15)	10
Conductivity (uS/cm)	376	328	450	7	368	319	431	85	377	326	415	6		
Odour	Inoff	Inoff	Inoff	7	Inoff	Inoff	Inoff	10	Inoff	Inoff	Inoff	6		
pH (N/A)	7.9	7.5	8.0	7	7.8	7.5	8.0	10	8.0	7.9	8.2	6	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.06	<0.03	0.21	53	0.11	0.05	0.68	85	0.10	0.05	0.21	53		1
<b>Primary Inorganics (mg/L) **</b>														
Aluminum	0.086	0.031	0.160	7	0.086	0.030	0.173	10	0.072	0.043	0.105	6	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6	0.006	
Arsenic	<0.0002	<0.0002	0.0002	7	<0.0002	<0.0002	0.0002	10	<0.0002	<0.0002	0.0002	6	0.01	
Barium	0.058	0.049	0.073	7	0.060	0.053	0.072	10	0.058	0.050	0.067	6	2	
Boron	0.009	0.007	0.012	7	0.009	0.008	0.011	10	0.008	0.007	0.009	6	5	
Bromate Dissolved	<0.005	<0.005	<0.005	14	<0.005	<0.005	<0.005	20	<0.005	<0.005	<0.005	12	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6	0.005	
Chlorate Dissolved	0.089	0.060	0.114	14	0.135	0.100	0.161	20	0.098	0.080	0.120	12	1	
Chlorine, total	1.79	1.55	2.00	54	1.74	1.48	2.03	86	1.17	0.74	1.48	67	>0.5 and <3.0	>1.0 and <2.4
Chlorite Dissolved	<0.005	<0.005	<0.005	14	<0.005	<0.005	<0.005	20	<0.005	<0.005	<0.005	12	1	
Chromium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6	0.05	
Copper	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	10	0.008	<0.005	0.023	6	(1)	
Fluoride	0.66	0.63	0.69	7	0.68	0.66	0.71	10	0.67	0.65	0.70	6	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6	0.005	
Manganese	<0.002	<0.002	<0.002	7	<0.002	<0.002	<0.002	10	<0.002	<0.002	<0.002	6	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6	0.001	
Nitrate (as N) Dissolved	0.079	0.060	0.101	14	0.077	0.050	0.114	20	0.089	0.080	0.116	12	10	
Nitrite (as N) Dissolved	0.023	<0.010	0.040	14	0.027	<0.010	0.040	20	0.030	<0.010	0.050	12	1	
Selenium	<0.0002	<0.0002	0.0003	7	<0.0002	<0.0002	0.0003	10	0.0002	<0.0002	0.0003	6	0.05	
Strontium	0.425	0.391	0.453	7	0.426	0.376	0.465	10	0.422	0.379	0.465	6	7.0	
Uranium	<0.0005	<0.0005	0.0005	7	<0.0005	<0.0005	0.0006	10	<0.0005	<0.0005	0.0005	6	0.02	
<b>Primary Organics (ug/L) **</b>														
Benzene	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6	5	
Carbon Tetrachloride	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	10	<1.0	<1.0	<1.0	6	2	
Chlorobenzene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6	80 (30)	
Dichlorobenzene (1,2)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6	5 (1)	
Dichloroethylene (1,1)	<3.0	<3.0	<3.0	7	<3.0	<3.0	<3.0	10	<3.0	<3.0	<3.0	6	14	

**7.10 Castledowns, Clareview and Discovery Park Reservoirs  
2021**

Parameter													Limits	
	Castledowns				Clareview				Discovery Park				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Ethylbenzene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6	10	
Toluene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6	60 (24)	
Total Xylenes	<3	<3	<3	5	<3	<3	<3	8	<3	<3	<3	5	90	
Trichloroethylene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6	5	
<b>Secondary Inorganics (mg/L) ***</b>														
Alkalinity Total	122	110	137	7	121	108	133	10	124	106	137	6		
Beryllium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6		
Bromide Dissolved	0.021	<0.010	0.050	14	0.023	<0.010	0.050	20	0.027	<0.010	0.060	12		
Calcium	46.5	40.9	51.7	7	46.8	41.0	52.8	10	46.6	40.2	50.2	6		
Calcium Hardness	112	104	121	7	115	103	130	10	113	98	126	6		
Chloride Dissolved	6.1	5.3	6.7	14	5.6	4.2	7.3	20	5.9	5.6	6.8	12	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6		
Hardness, Total (mg CaCO3/L)	170	154	183	7	171	152	191	10	171	146	187	6		
Iron	<0.005	<0.005	0.006	7	0.011	0.009	0.016	10	0.011	<0.005	0.020	6	(0.3)	0.3
Lanthanum	<lnoff	<lnoff	<lnoff	7	<lnoff	<lnoff	<lnoff	10	<0	<0	<0	6		
Lithium	0.0031	0.0026	0.0039	7	0.0034	0.0030	0.0041	10	0.0030	0.0025	0.0034	6		
Magnesium	13.9	12.4	15.0	7	14.0	12.5	15.5	10	13.9	12.1	15.1	6		
Molybdenum	0.0007	0.0006	0.0008	7	0.0007	0.0006	0.0009	10	0.0007	0.0006	0.0008	6		
Nickel	<0.0005	<0.0005	0.0006	7	<0.0005	<0.0005	0.0007	10	0.0007	<0.0005	0.0014	6		
Phosphorus	<0.02	<0.02	<0.02	7	<0.02	<0.02	<0.02	10	<0.02	<0.02	<0.02	6		
Potassium	0.80	0.60	1.10	7	0.81	0.60	1.10	10	0.83	0.60	1.00	6		
Silicon	1.89	1.47	2.81	7	1.93	1.47	2.52	10	1.87	1.58	2.15	6		
Silver	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	10	<0.0002	<0.0002	<0.0002	6		
Sodium	11.0	7.2	27.2	7	8.9	5.6	19.5	10	9.9	7.4	17.4	6	(200)	
Sulphate Dissolved	61	52	94	14	59	52	83	20	59	52	78	12	(500)	
Thallium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	10	<0.0005	<0.0005	<0.0005	6		
Tin	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	10	<0.0005	<0.0005	<0.0005	6		
Titanium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	10	<0.0005	<0.0005	<0.0005	6		
Vanadium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	10	<0.0005	<0.0005	<0.0005	6		
Zinc	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	10	<0.005	<0.005	0.007	6	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	7	<0.0010	<0.0010	<0.0010	10	<0.0010	<0.0010	<0.0010	6		
<b>Secondary Organics (ug/L) ***</b>														
Bromodichloromethane	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		16
Bromoform	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	10	<1.0	<1.0	<1.0	6		
Chloroform	13.3	6.0	26.7	7	19.3	9.0	38.6	10	11.4	5.9	20.0	6		
Dibromochloromethane	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6		

**7.10 Castledowns, Clareview and Discovery Park Reservoirs  
2021**

Parameter													Limits	
	Castledowns				Clareview				Discovery Park				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Dichlorobenzene (1,3)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6	(15)	
Dichloroethylene, cis (1,2)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6		
Dichloroethylene, trans (1,2)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		
MIBK	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	10	<1.0	<1.0	<1.0	6		
Styrene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	10	<0.50	<0.50	<0.50	6		
Tetrachloroethane (1,1,2,2)	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	10	<1.0	<1.0	<1.0	6		
Total Organic Carbon	1.3	0.9	2.4	7	1.4	0.9	2.5	10	1.2	0.8	1.8	6		
Total Volatile Organics (NonTHM)	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	10	<1.0	<1.0	<1.0	6		
Total Volatile Organics (Unknown)	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	10	<1.0	<1.0	<1.0	6		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		
Xylene (1,2)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		
Xylene (1,4)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	10	<0.5	<0.5	<0.5	6		

**TABLE EXPLANATIONS:**

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

**7.11 Kaskitayo, Londonderry, Millwoods Reservoirs  
2021**

Parameter	Kaskitayo				Londonderry				Millwoods				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Physical</b>														
Colour (TCU)	0.8	0.5	1.3	6	0.8	<0.5	1.3	6	1.1	<0.5	2.0	7	(15)	10
Conductivity (uS/cm)	376	345	397	6	368	324	426	6	382	326	443	7		
Odour	Inoff	Inoff	Inoff	6	Inoff	Inoff	Inoff	6	Inoff	Inoff	Inoff	7		
pH (N/A)	7.9	7.7	8.1	6	7.8	7.4	8.0	6	8.0	7.8	8.1	7	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.06	<0.02	0.32	53	0.07	0.04	0.27	53	0.14	0.05	0.50	54		1
<b>Primary Inorganics (mg/L) **</b>														
Aluminum	0.082	0.049	0.125	6	0.091	0.031	0.173	6	0.078	0.029	0.164	7	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.006	
Arsenic	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	0.0002	6	<0.0002	<0.0002	0.0002	7	0.01	
Barium	0.059	0.049	0.068	6	0.058	0.052	0.072	6	0.060	0.048	0.074	7	2	
Boron	0.008	0.008	0.010	6	0.009	0.008	0.012	6	0.009	0.007	0.011	7	5	
Bromate Dissolved	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	14	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.005	
Chlorate Dissolved	0.095	0.080	0.114	12	0.139	0.101	0.166	12	0.090	0.060	0.123	14	1	
Chlorine, total	1.88	1.70	2.05	54	1.83	1.52	2.07	54	1.80	1.33	2.02	55	>0.5 and <3.0	>1.0 and <2.4
Chlorite Dissolved	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	14	1	
Chromium	<0.0002	<0.0002	0.0003	6	<0.0002	<0.0002	0.0002	6	<0.0002	<0.0002	<0.0002	7	0.05	
Copper	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	6	<0.005	<0.005	0.006	7	(1)	
Fluoride	0.69	0.66	0.72	6	0.68	0.66	0.71	6	0.65	0.64	0.68	7	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	0.0004	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.005	
Manganese	<0.002	<0.002	<0.002	6	<0.002	<0.002	<0.002	6	<0.002	<0.002	<0.002	7	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.001	
Nitrate (as N) Dissolved	0.072	0.050	0.090	12	0.078	0.060	0.109	12	0.080	0.070	0.100	14	10	
Nitrite (as N) Dissolved	0.030	0.010	0.050	12	0.025	<0.010	0.040	12	0.027	<0.010	0.040	14	1	
Selenium	<0.0002	<0.0002	0.0003	6	<0.0002	<0.0002	0.0002	6	0.0003	<0.0002	0.0003	7	0.05	
Strontium	0.426	0.354	0.464	6	0.424	0.402	0.445	6	0.429	0.401	0.475	7	7.0	
Uranium	<0.0005	<0.0005	0.0006	6	<0.0005	<0.0005	0.0005	6	<0.0005	<0.0005	0.0005	7	0.02	
<b>Primary Organics (ug/L) **</b>														
Benzene	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	5	
Carbon Tetrachloride	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	2	
Chlorobenzene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	80 (30)	
Dichlorobenzene (1,2)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	5 (1)	
Dichloroethylene (1,1)	<3.0	<3.0	<3.0	6	<3.0	<3.0	<3.0	6	<3.0	<3.0	<3.0	7	14	
Ethylbenzene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	10	

**7.11 Kaskitayo, Londonderry, Millwoods Reservoirs  
2021**

Parameter													Limits	
	Kaskitayo				Londonderry				Millwoods				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Toluene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	60 (24)	
Total Xylenes	<3	<3	<3	5	<3	<3	<3	5	<3	<3	<3	6	90	
Trichloroethylene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	5	
<b>Secondary Inorganics (mg/L) ***</b>														
Alkalinity Total	125	109	140	6	119	113	134	6	121	110	138	7		
Beryllium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7		
Bromide Dissolved	0.027	<0.010	0.060	12	0.023	<0.010	0.050	12	0.021	<0.010	0.050	14		
Calcium	47.9	41.6	54.0	6	45.4	41.2	47.8	6	45.6	40.5	48.8	7		
Calcium Hardness	116	105	125	6	112	102	120	6	111	102	116	7		
Chloride Dissolved	5.7	5.0	6.1	12	5.6	4.1	6.9	12	6.2	5.1	7.1	14	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7		
Hardness, Total (mg CaCO3/L)	174	143	191	6	168	156	182	6	167	154	179	7		
Iron	<0.005	<0.005	<0.005	6	<0.006	<0.005	0.009	6	0.008	<0.005	0.013	7	(0.3)	0.3
Lanthanum	<Inoff	<Inoff	<Inoff	6	<Inoff	<Inoff	<Inoff	6	<0	<0	<0	7		
Lithium	0.0031	0.0028	0.0036	6	0.0033	0.0030	0.0039	6	0.0030	0.0026	0.0034	7		
Magnesium	14.3	12.2	15.9	6	13.7	12.6	14.4	6	13.6	12.5	14.6	7		
Molybdenum	0.0007	0.0006	0.0008	6	0.0007	0.0006	0.0008	6	0.0007	0.0006	0.0008	7		
Nickel	<0.0006	<0.0005	0.0013	6	<0.0005	<0.0005	0.0006	6	<0.0005	<0.0005	0.0006	7		
Phosphorus	<0.02	<0.02	<0.02	6	<0.02	<0.02	<0.02	6	<0.02	<0.02	<0.02	7		
Potassium	0.70	0.60	0.80	6	0.82	0.60	1.10	6	0.81	0.60	1.00	7		
Silicon	1.89	1.46	2.20	6	1.87	1.51	2.60	6	1.91	1.48	2.49	7		
Silver	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7		
Sodium	9.8	7.1	13.3	6	9.7	5.6	20.9	6	12.7	6.8	24.3	7	(200)	
Sulphate Dissolved	60	52	70	12	60	52	85	12	64	52	87	14	(500)	
Thallium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Tin	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Titanium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Vanadium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Zinc	<0.005	<0.005	<0.005	6	<0.006	<0.005	0.009	6	<0.005	<0.005	0.006	7	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	6	<0.0010	<0.0010	<0.0010	6	<0.0010	<0.0010	<0.0010	7		
<b>Secondary Organics (ug/L) ***</b>														
Bromodichloromethane	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		16
Bromoform	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Chloroform	15.6	8.5	29.3	6	15.8	8.3	30.4	6	14.6	5.6	29.3	7		
Dibromochloromethane	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Dichlorobenzene (1,3)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Dichloroethylene, cis (1,2)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Dichloroethylene, trans (1,2)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		

**7.11 Kaskitayo, Londonderry, Millwoods Reservoirs  
2021**

Parameter													Limits	
	Kaskitayo				Londonderry				Millwoods				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	(15)	
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
MIBK	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Styrene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Tetrachloroethane (1,1,2,2)	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Total Organic Carbon	1.2	0.9	1.4	6	1.3	0.8	2.4	6	1.4	0.8	2.4	7		
Total Volatile Organics (NonTHM)	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Total Volatile Organics (Unknown)	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
Xylene (1,2)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
Xylene (1,4)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		

**TABLE EXPLANATIONS:**

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives



**7.12 North Jasper Place, Ormsby, Papaschase 1 Reservoirs  
2021**

Parameter	North Jasper Place				Ormsby				Papaschase 1				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Physical</b>														
Colour (TCU)	0.8	<0.5	1.5	6	0.9	<0.5	2.0	7	0.8	<0.5	1.6	7	(15)	10
Conductivity (uS/cm)	378	341	398	6	367	328	446	7	373	338	425	7		
Odour	Inoff	Inoff	Inoff	6	Inoff	Inoff	Inoff	7	Inoff	Inoff	Inoff	7		
pH (N/A)	7.9	7.7	8.1	6	7.8	7.5	8.0	7	7.8	7.5	8.0	7	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.08	0.05	0.15	52	0.08	0.04	0.33	54	0.11	0.06	0.28	49		1
<b>Primary Inorganics (mg/L) **</b>														
Aluminum	0.075	0.044	0.098	6	0.102	0.029	0.177	7	0.078	0.037	0.153	7	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	0.0003	7	<0.0002	<0.0002	<0.0002	7	0.006	
Arsenic	<0.0002	<0.0002	0.0002	6	<0.0002	<0.0002	0.0003	7	<0.0002	<0.0002	0.0003	7	0.01	
Barium	0.059	0.052	0.068	6	0.057	0.049	0.074	7	0.058	0.053	0.073	7	2	
Boron	0.008	0.007	0.010	6	0.009	0.007	0.011	7	0.009	0.008	0.011	7	5	
Bromate Dissolved	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	14	<0.005	<0.005	<0.005	14	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7	0.005	
Chlorate Dissolved	0.093	0.070	0.108	12	0.092	0.060	0.116	14	0.124	0.100	0.150	14	1	
Chlorine, total	1.52	1.12	1.84	53	1.81	1.59	2.00	55	1.64	1.13	2.00	50	>0.5 and <3.0	>1.0 and <2.4
Chlorite Dissolved	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	14	<0.005	<0.005	<0.005	14	1	
Chromium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7	0.05	
Copper	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	7	(1)	
Fluoride	0.67	0.64	0.69	6	0.66	0.64	0.68	7	0.67	0.64	0.70	7	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7	0.005	
Manganese	<0.002	<0.002	<0.002	6	<0.002	<0.002	<0.002	7	<0.002	<0.002	<0.002	7	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7	0.001	
Nitrate (as N) Dissolved	0.077	0.070	0.090	12	0.074	0.060	0.100	14	0.086	0.070	0.124	14	10	
Nitrite (as N) Dissolved	0.030	<0.010	0.050	12	0.027	<0.010	0.040	14	0.029	<0.010	0.050	14	1	
Selenium	<0.0002	<0.0002	0.0003	6	<0.0002	<0.0002	0.0003	7	0.0002	<0.0002	0.0003	7	0.05	
Strontium	0.425	0.384	0.451	6	0.422	0.394	0.463	7	0.420	0.390	0.457	7	7.0	
Uranium	<0.0005	<0.0005	0.0005	6	<0.0005	<0.0005	0.0006	7	<0.0005	<0.0005	0.0005	7	0.02	
<b>Primary Organics (ug/L) **</b>														
Benzene	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7	5	
Carbon Tetrachloride	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	7	2	
Chlorobenzene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7	80 (30)	
Dichlorobenzene (1,2)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7	5 (1)	
Dichloroethylene (1,1)	<3.0	<3.0	<3.0	6	<3.0	<3.0	<3.0	7	<3.0	<3.0	<3.0	7	14	
Ethylbenzene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7	10	

**7.12 North Jasper Place, Ormsby, Papaschase 1 Reservoirs  
2021**

Parameter													Limits	
	North Jasper Place				Ormsby				Papaschase 1				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Toluene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7	60 (24)	
Total Xylenes	<3	<3	<3	5	<3	<3	<3	6	<3	<3	<3	6	90	
Trichloroethylene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7	5	
<b>Secondary Inorganics (mg/L) ***</b>														
Alkalinity Total	122	108	135	6	119	111	138	7	119	111	135	7		
Beryllium	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7		
Bromide Dissolved	0.027	<0.010	0.060	12	0.027	<0.010	0.050	14	0.030	<0.010	0.060	14		
Calcium	47.9	42.2	52.3	6	44.5	40.0	48.4	7	45.7	42.9	48.6	7		
Calcium Hardness	115	103	127	6	108	98	118	7	108	98	118	7		
Chloride Dissolved	5.9	5.4	6.7	12	6.0	5.1	6.7	14	5.9	4.5	7.3	14	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7		
Hardness, Total (mg CaCO3/L)	172	153	189	6	165	154	178	7	167	161	178	7		
Iron	<0.005	<0.005	0.006	6	<0.005	<0.005	<0.005	7	0.012	0.008	0.019	7	(0.3)	0.3
Lanthanum	<Inoff	<Inoff	<Inoff	6	<Inoff	<Inoff	<Inoff	7	<0	<0	<0	7		
Lithium	0.0031	0.0028	0.0036	6	0.0029	0.0026	0.0034	7	0.0032	0.0027	0.0038	7		
Magnesium	14.2	12.4	15.3	6	13.5	12.3	14.5	7	13.7	12.9	14.6	7		
Molybdenum	0.0007	0.0006	0.0008	6	0.0007	0.0006	0.0008	7	0.0007	0.0007	0.0008	7		
Nickel	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	0.0006	7	<0.0005	<0.0005	0.0006	7		
Phosphorus	<0.02	<0.02	<0.02	6	<0.02	<0.02	<0.02	7	<0.02	<0.02	<0.02	7		
Potassium	0.73	0.60	0.90	6	0.76	0.60	1.00	7	0.83	0.70	1.10	7		
Silicon	1.88	1.49	2.22	6	1.79	1.48	2.50	7	1.87	1.66	2.38	7		
Silver	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	7		
Sodium	9.8	7.3	14.1	6	10.5	7.0	25.5	7	9.4	6.2	19.5	7	(200)	
Sulphate Dissolved	59	51	72	12	60	52	89	14	60	53	81	14	(500)	
Thallium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	7		
Tin	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	7		
Titanium	0.0008	<0.0005	0.0023	6	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	7		
Vanadium	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	7		
Zinc	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	7	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	6	<0.0010	<0.0010	<0.0010	7	<0.0010	<0.0010	<0.0010	7		
<b>Secondary Organics (ug/L) ***</b>														
Bromodichloromethane	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7		16
Bromoform	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	7		
Chloroform	17.7	10.0	31.9	6	13.5	5.7	29.1	7	16.0	10.9	30.6	7		
Dibromochloromethane	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7		
Dichlorobenzene (1,3)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7		
Dichloroethylene, cis (1,2)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7		
Dichloroethylene, trans (1,2)	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7		

**7.12 North Jasper Place, Ormsby, Papaschase 1 Reservoirs  
2021**

Parameter	North Jasper Place				Ormsby				Papaschase 1				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Dichloropropane (1,2)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7	(15)
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7		
MIBK	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	7		
Styrene	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	7		
Tetrachloroethane (1,1,2,2)	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	7		
Total Organic Carbon	1.3	0.9	1.7	6	1.2	0.8	2.4	7	1.3	1.0	2.3	7		
Total Volatile Organics (NonTHM)	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	7		
Total Volatile Organics (Unknown)	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	7		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7		
Xylene (1,2)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7		
Xylene (1,4)	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	7		

**TABLE EXPLANATIONS:**

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

**7.13 Papaschase 2, Rosslyn 1, Rosslyn 2 Reservoirs  
2021**

Parameter	Papaschase 2				Rosslyn 1				Rosslyn 2				Limits	
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Physical</b>														
Colour (TCU)	0.8	<0.5	1.9	7	0.8	0.5	1.3	6	0.8	<0.5	1.5	7	(15)	10
Conductivity (uS/cm)	375	331	392	7	373	335	429	6	371	333	393	7		
Odour	Inoff	Inoff	Inoff	7	Inoff	Inoff	Inoff	6	Inoff	Inoff	Inoff	7		
pH (N/A)	7.9	7.7	8.1	7	7.8	7.5	8.1	6	7.8	7.7	8.0	7	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.08	0.04	0.53	53	0.14	0.05	1.20	50	0.07	0.04	0.30	53		1
<b>Primary Inorganics (mg/L) **</b>														
Aluminum	0.088	0.053	0.181	7	0.086	0.036	0.156	6	0.094	0.048	0.232	7	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.006	
Arsenic	<0.0002	<0.0002	0.0002	7	<0.0002	<0.0002	0.0002	6	<0.0002	<0.0002	0.0002	7	0.01	
Barium	0.059	0.049	0.069	7	0.059	0.054	0.071	6	0.058	0.052	0.067	7	2	
Boron	0.008	0.008	0.010	7	0.009	0.008	0.012	6	0.008	0.008	0.010	7	5	
Bromate Dissolved	<0.005	<0.005	<0.005	14	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	14	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.005	
Chlorate Dissolved	0.114	0.100	0.151	14	0.122	0.090	0.146	12	0.133	0.107	0.146	14	1	
Chlorine, total	1.83	1.14	2.06	54	1.65	1.26	1.99	51	1.68	1.17	2.03	54	>0.5 and <3.0	>1.0 and <2.4
Chlorite Dissolved	<0.005	<0.005	<0.005	14	<0.005	<0.005	<0.005	12	<0.005	<0.005	<0.005	14	1	
Chromium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.05	
Copper	<0.005	<0.005	<0.005	7	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	7	(1)	
Fluoride	0.69	0.67	0.72	7	0.68	0.66	0.72	6	0.67	0.64	0.70	7	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.005	
Manganese	<0.002	<0.002	<0.002	7	<0.002	<0.002	<0.002	6	<0.002	<0.002	<0.002	7	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7	0.001	
Nitrate (as N) Dissolved	0.073	0.050	0.090	14	0.081	0.060	0.127	12	0.076	0.060	0.090	14	10	
Nitrite (as N) Dissolved	0.031	<0.010	0.050	14	0.025	<0.010	0.040	12	0.033	<0.010	0.050	14	1	
Selenium	<0.0002	<0.0002	0.0003	7	0.0002	<0.0002	0.0003	6	0.0003	<0.0002	0.0004	7	0.05	
Strontium	0.431	0.372	0.458	7	0.428	0.407	0.450	6	0.424	0.381	0.454	7	7.0	
Uranium	<0.0005	<0.0005	0.0005	7	<0.0005	<0.0005	0.0005	6	<0.0005	<0.0005	0.0005	7	0.02	
<b>Primary Organics (ug/L) **</b>														
Benzene	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	5	
Carbon Tetrachloride	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7	2	
Chlorobenzene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	80 (30)	
Dichlorobenzene (1,2)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	5 (1)	
Dichloroethylene (1,1)	<3.0	<3.0	<3.0	7	<3.0	<3.0	<3.0	6	<3.0	<3.0	<3.0	7	14	
Ethylbenzene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	10	

**7.13 Papaschase 2, Rosslyn 1, Rosslyn 2 Reservoirs  
2021**

Parameter													Limits	
	Papaschase 2				Rosslyn 1				Rosslyn 2				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Toluene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	60 (24)	
Total Xylenes	<3	<3	<3	6	<3	<3	<3	5	<3	<3	<3	6	90	
Trichloroethylene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7	5	
<b>Secondary Inorganics (mg/L) ***</b>														
Alkalinity Total	124	108	137	7	121	110	135	6	121	107	136	7		
Beryllium	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7		
Bromide Dissolved	0.024	<0.010	0.060	14	0.023	<0.010	0.050	12	0.031	<0.010	0.060	14		
Calcium	47.9	41.2	54.0	7	46.3	42.2	51.8	6	46.7	42.0	52.2	7		
Calcium Hardness	116	103	124	7	113	106	123	6	114	102	126	7		
Chloride Dissolved	5.5	4.9	6.2	14	5.9	4.5	7.7	12	5.5	4.8	7.2	14	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7		
Hardness, Total (mg CaCO3/L)	174	148	189	7	170	159	179	6	171	154	191	7		
Iron	<0.006	<0.005	0.012	7	0.006	<0.005	0.009	6	<0.006	<0.005	0.010	7	(0.3)	0.3
Lanthanum	<Inoff	<Inoff	<Inoff	7	<Inoff	<Inoff	<Inoff	6	<0	<0	<0	7		
Lithium	0.0032	0.0029	0.0039	7	0.0033	0.0031	0.0042	6	0.0033	0.0030	0.0038	7		
Magnesium	14.4	12.5	15.9	7	14.0	12.8	15.1	6	14.1	12.6	15.3	7		
Molybdenum	0.0007	0.0006	0.0009	7	0.0007	0.0006	0.0008	6	0.0007	0.0006	0.0008	7		
Nickel	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	0.0006	6	<0.0005	<0.0005	<0.0005	7		
Phosphorus	<0.02	<0.02	<0.02	7	<0.02	<0.02	<0.02	6	<0.02	<0.02	<0.02	7		
Potassium	0.71	0.60	0.80	7	0.87	0.70	1.20	6	0.76	0.70	0.90	7		
Silicon	1.82	1.46	2.20	7	1.88	1.50	2.56	6	1.82	1.48	2.22	7		
Silver	<0.0002	<0.0002	<0.0002	7	<0.0002	<0.0002	<0.0002	6	<0.0002	<0.0002	<0.0002	7		
Sodium	8.9	7.1	12.1	7	10.0	6.2	20.2	6	7.9	7.0	9.2	7	(200)	
Sulphate Dissolved	59	52	68	14	60	52	81	12	57	52	64	14	(500)	
Thallium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Tin	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Titanium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Vanadium	<0.0005	<0.0005	<0.0005	7	<0.0005	<0.0005	<0.0005	6	<0.0005	<0.0005	<0.0005	7		
Zinc	<0.005	<0.005	0.007	7	<0.005	<0.005	<0.005	6	<0.005	<0.005	<0.005	7	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	7	<0.0010	<0.0010	<0.0010	6	<0.0010	<0.0010	<0.0010	7		
<b>Secondary Organics (ug/L) ***</b>														
Bromodichloromethane	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		16
Bromoform	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Chloroform	16.0	8.4	34.0	7	16.4	10.6	28.6	6	17.4	10.3	36.9	7		
Dibromochloromethane	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Dichlorobenzene (1,3)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Dichloroethylene, cis (1,2)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Dichloroethylene, trans (1,2)	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		

**7.13 Papaschase 2, Rosslyn 1, Rosslyn 2 Reservoirs  
2021**

Parameter													Limits	
	Papaschase 2				Rosslyn 1				Rosslyn 2				*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Mean	Min	Max	Count	Mean	Min	Max	Count	Mean	Min	Max	Count		
Dichloropropane (1,2)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7	(15)	
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
MIBK	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Styrene	<0.50	<0.50	<0.50	7	<0.50	<0.50	<0.50	6	<0.50	<0.50	<0.50	7		
Tetrachloroethane (1,1,2,2)	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Total Organic Carbon	1.2	0.9	1.5	7	1.3	1.0	2.3	6	1.2	0.9	1.6	7		
Total Volatile Organics (NonTHM)	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Total Volatile Organics (Unknown)	<1.0	<1.0	<1.0	7	<1.0	<1.0	<1.0	6	<1.0	<1.0	<1.0	7		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
Xylene (1,2)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		
Xylene (1,4)	<0.5	<0.5	<0.5	7	<0.5	<0.5	<0.5	6	<0.5	<0.5	<0.5	7		

TABLE EXPLANATIONS:

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

**7.14 Thorncliff Reservoir  
2021**

Parameter	Thorncliff				Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
<b>Physical</b>						
Colour (TCU)	0.7	<0.5	0.9	6	(15)	10
Conductivity (uS/cm)	375	331	398	6		
Odour	Inoff	Inoff	Inoff	6		
pH (N/A)	7.9	7.8	8.1	6	(7.0 - 10.5)	7.3 - 8.3
Turbidity (NTU)	0.08	0.04	0.16	52		1
<b>Primary Inorganics (mg/L) **</b>						
Aluminum	0.087	0.041	0.116	6	2.9	0.1/0.2
Antimony	<0.0002	<0.0002	<0.0002	6	0.006	
Arsenic	<0.0002	<0.0002	0.0002	6	0.01	
Barium	0.059	0.052	0.067	6	2	
Boron	0.008	0.007	0.009	6	5	
Bromate Dissolved	<0.005	<0.005	<0.005	12	0.01	
Cadmium	<0.0002	<0.0002	<0.0002	6	0.005	
Chlorate Dissolved	0.093	0.070	0.106	12	1	
Chlorine, total	1.62	1.08	1.99	53	>0.5 and <3.0	>1.0 and <2.4
Chlorite Dissolved	<0.005	<0.005	<0.005	12	1	
Chromium	<0.0002	<0.0002	<0.0002	6	0.05	
Copper	<0.005	<0.005	<0.005	6	(1)	
Fluoride	0.69	0.65	0.75	6	1.5	0.6 - 0.8
Lead	<0.0002	<0.0002	<0.0002	6	0.005	
Manganese	<0.002	<0.002	<0.002	6	0.12 (0.02)	
Mercury	<0.0002	<0.0002	<0.0002	6	0.001	
Nitrate (as N) Dissolved	0.078	0.070	0.090	12	10	
Nitrite (as N) Dissolved	0.030	<0.010	0.050	12	1	
Selenium	0.0003	<0.0002	0.0003	6	0.05	
Strontium	0.422	0.374	0.450	6	7.0	
Uranium	<0.0005	<0.0005	0.0005	6	0.02	
<b>Primary Organics (ug/L) **</b>						
Benzene	<0.5	<0.5	<0.5	6	5	
Carbon Tetrachloride	<1.0	<1.0	<1.0	6	2	
Chlorobenzene	<0.50	<0.50	<0.50	6	80 (30)	
Dichlorobenzene (1,2)	<0.50	<0.50	<0.50	6	200 (3)	
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	6	5 (1)	
Dichloroethylene (1,1)	<3.0	<3.0	<3.0	6	14	
Ethylbenzene	<0.50	<0.50	<0.50	6	140 (1.6)	
Methylene Chloride	<0.5	<0.5	<0.5	6	50	
Tetrachloroethylene	<0.5	<0.5	<0.5	6	10	

**7.14 Thorncliff Reservoir  
2021**

Parameter	Thorncliff				Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
	Toluene	<0.50	<0.50	<0.50	6	60 (24)
Total Xylenes	<3	<3	<3	5	90	
Trichloroethylene	<0.50	<0.50	<0.50	6	5	
<b>Secondary Inorganics (mg/L) ***</b>						
Alkalinity Total	124	108	139	6		
Beryllium	<0.0002	<0.0002	<0.0002	6		
Bromide Dissolved	0.027	<0.010	0.060	12		
Calcium	47.5	41.2	52.6	6		
Calcium Hardness	116	101	126	6		
Chloride Dissolved	5.9	5.4	6.8	12	(250)	
Cobalt	<0.0002	<0.0002	<0.0002	6		
Hardness, Total (mg CaCO3/L)	174	148	191	6		
Iron	<0.005	<0.005	<0.005	6	(0.3)	0.3
Lanthanum	<Inoff	<Inoff	<Inoff	6		
Lithium	0.0031	0.0027	0.0035	6		
Magnesium	14.2	12.2	15.4	6		
Molybdenum	0.0007	0.0006	0.0008	6		
Nickel	<0.0005	<0.0005	0.0006	6		
Phosphorus	<0.02	<0.02	<0.02	6		
Potassium	0.73	0.60	0.90	6		
Silicon	1.87	1.50	2.24	6		
Silver	<0.0002	<0.0002	<0.0002	6		
Sodium	9.6	7.3	13.5	6	(200)	
Sulphate Dissolved	59	51	72	12	(500)	
Thallium	<0.0005	<0.0005	<0.0005	6		
Tin	<0.0005	<0.0005	<0.0005	6		
Titanium	<0.0005	<0.0005	<0.0005	6		
Vanadium	<0.0005	<0.0005	<0.0005	6		
Zinc	<0.005	<0.005	<0.005	6	(5.0)	
Zirconium	<0.0010	<0.0010	<0.0010	6		
<b>Secondary Organics (ug/L) ***</b>						
Bromodichloromethane	<0.5	<0.5	<0.5	6		16
Bromoform	<1.0	<1.0	<1.0	6		
Chloroform	16.7	9.4	31.8	6		
Dibromochloromethane	<0.50	<0.50	<0.50	6		
Dichlorobenzene (1,3)	<0.50	<0.50	<0.50	6		
Dichloroethylene, cis (1,2)	<0.50	<0.50	<0.50	6		
Dichloroethylene, trans (1,2)	<0.50	<0.50	<0.50	6		



**7.14 Thorncliff Reservoir  
2021**

Parameter	Thorncliff				Limits	
	Mean	Min	Max	Count	*Approval or GCDWQ MAC, (AO or OG)	EPCOR
Dichloropropane (1,2)	<0.5	<0.5	<0.5	6	(15)	
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	6		
MIBK	<1.0	<1.0	<1.0	6		
Styrene	<0.50	<0.50	<0.50	6		
Tetrachloroethane (1,1,2,2)	<1.0	<1.0	<1.0	6		
Total Organic Carbon	1.2	0.9	1.6	6		
Total Volatile Organics (NonTHM)	<1.0	<1.0	<1.0	6		
Total Volatile Organics (Unknown)	<1.0	<1.0	<1.0	6		
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	6		
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	6		
Xylene (1,2)	<0.5	<0.5	<0.5	6		
Xylene (1,4)	<0.5	<0.5	<0.5	6		

**TABLE EXPLANATIONS:**

- \* Numbers with no brackets are Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MAC) and/or a limit set out in the Alberta Environment and Parks (AEP) Operating Approval 638-04-00. Limits in brackets indicate Aesthetic Objectives or Operational Guidelines (OG) and are not Approval limits. The EPCOR limits are internal limits set by EPCOR in the Operations Program.
- \*\* Primary parameters are those that have health-based limits (MACs) according the AEP Operating Approval 638-04-00
- \*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

## 7.15 Distribution System Disinfection By-products

2021

Parameter	Mean	Min	Max	Count	Limits	
					GCDWQ or Approval or MAC* or (AO or OG)	EPCOR single result
<b>HAA (ug/L)</b>					80	40
<b>Far End of Distribution System</b>						
Dead End	16.8	10.6	27.2	11		
Water Transfer to Regional Customers	18.9	11.7	34.5	12		
<b>Middle of Distribution System</b>						
Convenience Store	19.8	19.8	19.8	1		
Key Tap	21.6	21.6	21.6	1		
Other Facilities	19.2	18.2	20.6	3		
Staff Residence	17.3	9.9	34.9	46		
	17.7	9.9	34.9	74		
<b>NDMA (ng/L)</b>					40	10
<b>Far End of Distribution System</b>						
Dead End	0.003	0.001	0.009	6		
Water Transfer to Regional Customers	0.001	0.001	0.002	5		
<b>Middle of Distribution System</b>						
Key Tap	0.009	0.009	0.009	1		
Other Facilities	0.009	0.009	0.009	1		
Staff Residence	0.003	0.001	0.009	25		
	0.003	0.001	0.009	38		
<b>Trihalomethanes (ug/L)</b>					100	50
<b>Far End of Distribution System</b>						
Dead End	16.4	8.8	30.8	11		
Water Transfer to Regional Customers	18.1	10.2	37.0	12		
<b>Middle of Distribution System</b>						
Convenience Store	17.1	17.1	17.1	1		
Field Reservoirs	15.8	5.6	38.6	88		
Key Tap	19.4	19.4	19.4	1		
Other Facilities	12.7	8.7	15.0	5		
Staff Residence	15.8	5.3	36.0	46		
	15.9	5.3	38.6	164		

## 7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2021

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
<b>Microbiologicals</b>								
Microcystin	<0.10	<0.10	0.13	12	<0.12	<0.10	0.30	12
<b>Physical</b>								
Colour (TCU)	5.8	2.0	29.3	364	5.8	1.9	31.0	365
Conductivity (uS/cm)	340	284	386	53	336	282	378	53
FPA-Intensity (N/A)	0.51	0.25	0.94	64	0.51	0.25	0.81	64
pH (N/A)	8.2	8.0	8.4	13	8.3	8.1	8.4	13
Total Dissolved Solids (mg/L)	201	171	231	13	205	166	234	13
Total Suspended Solids	<6	<5	10	14	25	<5	208	13
Turbidity (NTU)	9.84	1.07	309.00	364	10.68	1.15	238.00	365
<b>Primary Inorganics (mg/L) **</b>								
Aluminum	0.334	0.071	1.060	13	0.931	0.071	7.340	13
Antimony	<0.0002	<0.0002	<0.0002	13	<0.0002	<0.0002	<0.0002	13
Arsenic	0.0003	<0.0002	0.0006	13	0.0005	<0.0002	0.0022	13
Barium	0.065	0.054	0.087	13	0.074	0.053	0.174	13
Boron	0.009	0.007	0.014	13	0.009	0.007	0.018	13
Bromate Dissolved	<0.005	<0.005	<0.005	56	<0.005	<0.005	<0.005	56
Cadmium	<0.0002	<0.0002	<0.0002	13	<0.0002	<0.0002	<0.0002	13
Chlorate Dissolved	<0.01	<0.01	<0.01	56	<0.01	<0.01	<0.01	56
Chlorine, total	<0.03	<0.03	<0.03	13	<0.03	<0.03	<0.03	13
Chlorite Dissolved	<0.005	<0.005	<0.005	56	<0.005	<0.005	<0.005	56
Chromium	0.0004	<0.0002	0.0013	13	0.0012	<0.0002	0.0091	13
Copper	<0.005	<0.005	<0.005	13	<0.005	<0.005	0.008	13
Cyanide Dissolved	<0.002	<0.002	<0.002	12	<0.002	<0.002	<0.002	12
Fluoride	0.12	0.10	0.15	53	0.12	0.10	0.15	53
Lead	<0.0002	<0.0002	0.0003	13	0.0004	<0.0002	0.0027	13
Manganese	0.007	<0.002	0.019	13	0.020	0.002	0.151	13
Mercury	<0.00020	<0.00001	<0.00020	17	<0.00020	<0.00001	<0.00020	17
Nitrate (as N) Dissolved	0.07	0.02	0.17	56	0.07	0.02	0.13	56
Nitrite (as N) Dissolved	0.02	<0.01	0.05	56	0.02	<0.01	0.05	56
Selenium	0.0002	<0.0002	0.0003	13	0.0002	<0.0002	0.0003	13
Uranium	<0.0005	<0.0005	0.0006	13	<0.0005	<0.0005	0.0008	13

7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2021

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
<b>Primary Organics (ug/L) **</b>								
2,4-D	<10	<10	<10	4	<10	<10	<10	4
2,4-Dichlorophenol	<0.3	<0.3	<0.3	4	<0.3	<0.3	<0.3	4
Atrazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Benzene	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Benzo(a)pyrene	<0.005	<0.005	<0.005	4	<0.005	<0.005	<0.005	4
Bromoxynil	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4
Carbon Tetrachloride	<1.0	<0.5	<1.0	367	<1.0	<0.5	<1.0	368
Chlorobenzene	<0.4946	<0.0005	<0.5000	370	<0.4946	<0.0005	<0.5000	371
Chlorpyrifos	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Cyanazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Diazinon	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Dicamba	<12	<12	<12	4	<12	<12	<12	4
Dichlorobenzene (1,2)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Dichlorobenzene (1,4)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Dichloroethane (1,2)	<0.5	<0.5	<0.5	2	<0.5	<0.5	<0.5	2
Dichloroethylene (1,1)	<3	<3	<3	366	<3	<3	<3	367
Diclofop-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Dimethoate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Diuron	<1	<1	<1	4	<1	<1	<1	4
Ethylbenzene	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Glyphosate	<2.51	<0.01	<5.00	4	<2.51	<0.01	<5.00	4
Malathion	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
MCPA	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4
Methylene Chloride	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Metolachlor	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Metribuzin	<1	<1	<1	4	<1	<1	<1	4
Nitritriacetic acid	<0.2	<0.2	<0.2	4	<0.2	<0.2	<0.2	4
Pentachlorophenol	<6	<6	<6	4	<6	<6	<6	4
Perfluorooctane sulfonic acid (PFOS)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Perfluorooctanoic acid (PFOA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Phorate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Picloram	<19	<19	<19	4	<19	<19	<19	4
Simazine	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Terbufos	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Tetrachloroethylene	<0.5	<0.5	<0.5	367	<0.5	<0.5	<0.5	368
Toluene	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Total Xylenes	<2.5	<2.5	<2.5	329	<2.5	<2.5	<2.5	331
Trichloroethylene	<0.5	<0.5	<0.5	367	<0.5	<0.5	<0.5	368
Trifluralin	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Trihalomethanes	<1	<1	<1	367	<1	<1	<1	368
Vinyl Chloride	<1	<1	<1	2	<1	<1	<1	2
<b>Radionuclides (Bq/L)</b>								
Cesium-137	<0.2	<0.1	<0.3	2	<0.2	<0.1	<0.2	2
Gross Alpha	<0.11	<0.09	<0.12	2	<0.11	<0.09	<0.13	2
Gross Beta	<0.06	<0.05	<0.07	2	<0.06	<0.04	<0.07	2
Iodine-131	<0.4	<0.3	<0.4	2	<0.4	<0.3	<0.4	2
Lead-210	<0.02	<0.02	<0.02	2	<0.02	<0.02	<0.02	2
Radium-226	<0.005	<0.005	<0.005	2	<0.005	<0.005	<0.005	2
Strontium-90	<0.05	<0.05	<0.05	2	<0.05	<0.05	<0.05	2
Tritium	<28	<15	<40	2	<28	<15	<40	2

## 7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2021

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
Secondary Inorganics (mg/L) ***								
Alkalinity Total	128	110	143	53	128	110	145	53
Alkalinity, PHP (mg CaCO3/L)	<1	<1	2	13	1	<1	3	13
Ammonia as NH3	<0.05	<0.05	<0.05	68	<0.05	<0.05	<0.05	68
Beryllium	<0.0002	<0.0002	<0.0002	13	<0.0002	<0.0002	0.0002	13
Bromide Dissolved	0.03	<0.01	0.11	56	0.03	<0.01	0.11	56
Calcium Dissolved	46.5	40.1	54.1	13	46.0	39.7	53.0	13
Calcium Hardness	112	93	135	53	109	64	134	53
Chloride Dissolved	1.3	0.5	4.8	56	0.7	0.4	1.7	56
Chlorine Free	<0.03	<0.03	<0.03	13	<0.03	<0.03	<0.03	13
Cobalt	<0.0002	<0.0002	0.0002	13	0.0004	<0.0002	0.0023	13
Hardness, Total (mg CaCO3/L)	170	147	199	53	170	145	201	53
Iron	0.203	0.061	0.600	13	0.698	0.091	5.770	13
Lanthanum	<0.001	<0.001	<0.001	13	<0.001	<0.001	0.004	13
Lithium	0.0036	0.0029	0.0050	13	0.0039	0.0028	0.0087	13
Magnesium	14.4	12.4	16.3	13	14.6	12.2	17.5	13
Manganese Dissolved	<0.002	<0.002	<0.002	13	0.003	<0.002	0.007	13
Molybdenum	0.0007	0.0006	0.0009	13	0.0007	0.0006	0.0011	13
Nickel	0.0007	<0.0005	0.0015	13	0.0017	<0.0005	0.0079	13
Ortho_P	<0.02	<0.02	<0.02	12	<0.02	<0.02	<0.02	12
Phosphorus	<0.02	<0.02	0.03	13	0.03	<0.02	0.17	13
Potassium	0.8	0.6	1.3	13	1.0	0.6	2.9	13
Silicon	2.43	1.61	4.44	13	3.66	1.63	16.50	13
Silver	<0.0002	<0.0002	<0.0002	13	<0.0002	<0.0002	<0.0002	13
Sodium	4.0	2.4	6.6	13	3.5	2.3	5.6	13
Strontium	0.439	0.367	0.470	13	0.443	0.370	0.484	13
Sulphate Dissolved	48.0	37.7	54.1	56	47.6	37.0	53.4	56
Sulphide	<0.002	<0.002	<0.002	12	<0.002	<0.002	<0.002	12
Thallium	<0.0005	<0.0005	<0.0005	13	<0.0005	<0.0005	<0.0005	13
Tin	<0.0005	<0.0005	<0.0005	13	<0.0005	<0.0005	<0.0005	13
Titanium	0.0053	0.0006	0.0157	13	0.0154	0.0014	0.1110	13
Total Kjeldahl Nitrogen	3.5	<0.1	43.7	13	0.2	<0.1	1.5	13
Vanadium	0.0009	<0.0005	0.0028	13	0.0024	<0.0005	0.0175	13
Zinc	<0.005	<0.005	0.008	13	<0.006	<0.005	0.022	13
Zirconium	<0.001	<0.001	<0.001	13	<0.001	<0.001	0.002	13

7.16 Raw River Water: Physical, Inorganic, Organic and Pesticide Parameters

2021

	ROSSDALE				E.L. SMITH			
	Mean	Min	Max	Count	Mean	Min	Max	Count
Secondary Organics (ug/L) ***								
Aldicarb	<0.9	<0.9	<0.9	4	<0.9	<0.9	<0.9	4
Aldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4
Azinphos-methyl	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Bromodichloromethane	<0.5	<0.5	<0.5	367	<0.5	<0.5	<0.5	368
Bromoform	<1.0	<0.5	<1.0	367	<1.0	<0.5	<1.0	368
Carbaryl	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4
Carbofuran	<0.5	<0.5	<0.5	4	<0.5	<0.5	<0.5	4
Chloroform	<0.49	<0.00	<0.50	371	<0.49	<0.00	<0.50	372
Dibromochloromethane	<0.4947	<0.0005	<0.5000	371	<0.4947	<0.0005	<0.5000	372
Dichlorobenzene (1,3)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Dichloroethylene, cis (1,2)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Dichloroethylene, trans (1,2)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Dichloropropane (1,2)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Dieldrin	<0.008	<0.008	<0.008	4	<0.008	<0.008	<0.008	4
Methyl t-Butyl Ether (MTBE)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
MIBK	<1	<1	<1	366	<1	<1	<1	367
Parathion	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Perfluorobutanoic acid (PFBA)	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Perfluoroheptanoic acid (PFHpA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Perfluorohexane sulfonic acid (PFHxS)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Perfluorohexanoic acid (PFHxA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Perfluorononanoic acid (PFNA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Perfluoropentanoic acid (PFPeA)	<0.01	<0.01	<0.01	4	<0.01	<0.01	<0.01	4
Styrene	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Tetrachloroethane (1,1,2,2)	<1.0	<0.5	<1.0	367	<1.0	<0.5	<1.0	368
Total Organic Carbon	1.7	1.1	5.3	53	1.7	0.9	4.9	53
Total Volatile Organics (NonTHM)	<1	<1	<1	366	<1	<1	<1	367
Total Volatile Organics (Unknown)	<1	<1	<1	364	<1	<1	<1	365
Triallate	<0.1	<0.1	<0.1	4	<0.1	<0.1	<0.1	4
Trichlorobenzene (1,2,4)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Trichloroethane (1,1,1)	<0.5	<0.5	<0.5	367	<0.5	<0.5	<0.5	368
Xylene (1,2)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367
Xylene (1,4)	<0.5	<0.5	<0.5	366	<0.5	<0.5	<0.5	367

TABLE EXPLANATIONS:

\*\* Primary parameters are those that have health-based limits (MACs) according to the AEP Operating Approval 638-04-00

\*\*\* Secondary parameters do not have health-based limits but may have aesthetic or operational objectives

## 7. 17 EPCOR Lead Management Program (2021)

EPCOR has had a proactive lead management program in place since 2008, which aims to reduce exposures to lead in drinking water. For many years a major focus of the lead management program was dealing with lead service lines. The underground pipe that connects a property's plumbing to the water main in the street is called a service line. The EPCOR portion of the service line runs from the water main under the street or alley to the property line, and the homeowner (or business owner) portion of the service line runs from the property line to the water meter in the home or building. At the end of 2021, approximately 4,200 homes had lead service lines in Edmonton on either the EPCOR side or the homeowner side, or both. These are homes located in older neighbourhoods that were typically built before 1950. They represent about 1.4% of the approximately 274,000 homes in the City supplied with EPCOR water.

On July 18, 2019 the City of Edmonton approved a new Lead Mitigation Strategy. The goal of the program is to ensure that the lead concentration at the tap in all homes and businesses supplied through lead service lines in the City of Edmonton is less than the Health Canada Maximum Acceptable Concentration (MAC) for lead of 5 µg/L and to reduce lead release from all other sources of lead, such as lead-containing plumbing components, in all homes across the city. EPCOR's Lead Management Program has three main components:

1. Adding a lead Inhibitor (orthophosphate) to the Edmonton drinking water: Orthophosphate creates a protective coating on the inside of lead pipes and plumbing that prevents lead from leaching into drinking water. It is commonly used for this purpose by water utilities across North America and the United Kingdom. It has no impact on the taste or odour of drinking water. It is naturally present in food and is a common additive to beverages and considered to be a safe additive. Orthophosphate addition systems are being designed and constructed at our two water treatment plants and will be operational by the end of 2022.
2. Elimination of Partial Lead Service Line Replacements / Utility Funding of Private Portion Replacements: EPCOR has ended the practice of replacing just the utility portion of a lead service line while leaving the private portion in place. These partial lead service line replacements are not effective for lead reduction and can sometimes result in higher lead levels at the tap. On a go-forward basis, EPCOR will replace from the LSL from "main to meter". That is, we will replace the private portion any time we replace the utility portion. Both the utility and private portion replacements will be funded through water utility rates at no cost to the recipient.
3. Accelerated Replacement of High Priority Lead Service Lines / Utility Funding of Private Portion Replacements: EPCOR will accelerate the replacement of any lead service lines (private and utility portions) that have been identified through testing as having lead levels in excess of the new Health Canada Guideline after the implementation of orthophosphate. Both the utility and private portion replacements for these "High Priority" LSLs will be funded through water utility rates at no cost to the recipient.

EPCOR completed the design and begin construction of facilities to add the lead inhibitor orthophosphate to the Edmonton drinking water in 2021. Commissioning of those facilities and the start

of orthophosphate now is expected by end of 2022. Orthophosphate will ensure that lead levels remain low in all other homes/businesses with lead service lines, but ongoing customer communication and monitoring for lead at the tap will be required. EPCOR will continue to monitor for lead at the tap in 2023 and beyond to ensure effectiveness of lead reduction through the addition of orthophosphate.

As per the 2020 Guidance Document for Managing Lead in Municipal Drinking Water Systems: Phase 1 (v1.3), home addresses sampled and lead results will be reported annually as a separate electronic Excel file. EPCOR will be submitting lead results in the report template specified by AEP in the lead Guidance Document on February 28, 2022.



## 7.18 REPORTABLE DETECTION LIMITS

Analyte	RDL	Unit
Alkalinity phenolphthalein	1	mg CaCO <sub>3</sub> /L
Alkalinity Total	1	mg CaCO <sub>3</sub> /L
Aluminum	0.005	mg/L
Ammonia as N	0.05	mg/L
Ammonia as NH <sub>3</sub>	0.05	mg/L
Antimony	0.0002	mg/L
Arsenic	0.0002	mg/L
Barium	0.002	mg/L
Benzene	0.5	µg/L
Beryllium	0.0002	mg/L
Bicarbonate	3	mg CaCO <sub>3</sub> /L
Boron	0.005	mg/L
Bromate Dissolved	0.005	mg/L
Bromide Dissolved	0.01	mg/L
Bromochloroacetic acid	1.0	ug/L
Bromodichloromethane	0.5	µg/L
Bromoform	1.0	µg/L
Cadmium	0.0002	mg/L
Calcium	0.1	mg/L
Calcium Dissolved	0.1	mg/L
Calcium Hardness	2	mg CaCO <sub>3</sub> /L
Carbon Tetrachloride	1.0	µg/L
Carbonate	3	mg CaCO <sub>3</sub> /L
Cellular ATP	0.01	pg/mL
Chlorate Dissolved	0.01	mg/L
Chloride Dissolved	0.1	mg/L
Chlorine Free	0.03	mg/L
Chlorine, total	0.03	mg/L
Chlorite Dissolved	0.005	mg/L
Chlorobenzene	0.5	µg/L
Chloroform	0.5	µg/L
Chromium	0.0002	mg/L
Cobalt	0.0002	mg/L
Coliforms, total	1.0	MPN/100 mL
Colour	0.5	TCU
Conductivity	1	µS/cm
Copper	0.005	mg/L
Copper Dissolved	0.005	mg/L
Cryptosporidium	1.8	oocysts/100L
Dibromoacetic acid	1.0	ug/L
Dibromochloromethane	0.5	µg/L
Dichloramine	0	mg/L
Dichloroacetic acid	2.0	ug/L
Dichlorobenzene (1,2)	0.5	µg/L
Dichlorobenzene (1,3)	0.5	µg/L
Dichlorobenzene (1,4)	0.5	µg/L
Dichloroethane (1,2)	0.5	µg/L
Dichloroethylene (1,1)	3.0	µg/L
Dichloroethylene, cis (1,2)	0.5	µg/L
Dichloroethylene, trans (1,2)	0.5	µg/L
Dichloropropane (1,2)	0.5	µg/L
Dissolved Organic Carbon	0.6	mg/L
E. coli	1.0	MPN/100 mL
Ethylbenzene	0.5	µg/L
Fluoride	0.05	mg/L
Giardia	1.8	cysts/100L
Haloacetic Acids, total (HAA5)	5.0	ug/L

## 7.18 REPORTABLE DETECTION LIMITS

Analyte	RDL	Unit
Haloacetic Acids, total (HAA6)	5.0	ug/L
Hardness, Total	2	mg CaCO3/L
Iron	0.005	mg/L
Lanthanum	0.001	mg/L
Lead	0.0002	mg/L
Lithium	0.0002	mg/L
Magnesium	0.1	mg/L
Manganese	0.002	mg/L
Manganese Dissolved	0.002	mg/L
Mercury	0.0002	mg/L
Methyl t-Butyl Ether (MTBE)	0.5	µg/L
Methylene Chloride	0.5	µg/L
MIBK	1.0	µg/L
Microcystin	0.10	µg/L
Molybdenum	0.0002	mg/L
Monobromoacetic acid	1.0	ug/L
Monochloramine	0.03	mg/L
Monochloroacetic acid	5.0	ug/L
Nickel	0.0005	mg/L
Nitrate (as N) Dissolved	0.01	mg/L
Nitrite (as N) Dissolved	0.01	mg/L
Ortho_P	0.02	mg/L
Phosphorus	0.02	mg/L
Potassium	0.1	mg/L
Selenium	0.0002	mg/L
Silicon	0.05	mg/L
Silver	0.0002	mg/L
Sodium	0.1	mg/L
Strontium	0.002	mg/L
Styrene	0.5	µg/L
Sulphate Dissolved	0.1	mg/L
Tetrachloroethane (1,1,2,2)	1.0	µg/L
Tetrachloroethylene	0.5	µg/L
Thallium	0.0005	mg/L
Tin	0.0005	mg/L
Titanium	0.0005	mg/L
Toluene	0.5	µg/L
Total Dissolved Solids	9	mg/L
Total Kjeldahl Nitrogen	0.1	mg N/L
Total Organic Carbon	0.6	mg/L
Total Suspended Solids	5	mg/L
Total Volatile Organics (NonTHM)	1.0	µg/L
Total Volatile Organics (Unknown)	1.0	µg/L
Total Xylenes	2.5	µg/L
Trichloroacetic acid	3.0	ug/L
Trichlorobenzene (1,2,4)	0.5	µg/L
Trichloroethane (1,1,1)	0.5	µg/L
Trichloroethylene	0.5	µg/L
Trihalomethanes	1.0	µg/L
Turbidity	0.04	NTU
Uranium	0.0005	mg/L
UV 254 % Transmittance	99.8	%T/cm
Vanadium	0.0005	mg/L
Vinyl Chloride	1.0	µg/L
Xylene (1,2)	0.5	µg/L
Xylene (1,4)	0.5	µg/L
Zinc	0.005	mg/L
Zirconium	0.001	mg/L

### 7.18 REPORTABLE DETECTION LIMITS

Analyte	RDL	Unit
Zirconium Dissolved	0.001	mg/L

## 7.18 REPORTABLE DETECTION LIMITS

Analyte	RDL	Unit
<b>Contract Lab Analysis</b>		
1,1-Dichloroethene	0.001	mg/L
1,2,3-Trichlorobenzene	0.001	mg/L
1,2,4-Trichlorobenzene	0.001	mg/L
1,2-Dichlorobenzene	0.0005	mg/L
1,2-Dichloroethane	0.001	mg/L
1,4-Dichlorobenzene	0.001	mg/L
2,3,4,6-Tetrachlorophenol	1	µg/L
2,4,5-T	28	µg/L
2,4,6-Trichlorophenol	0.5	µg/L
2,4-D	10	µg/L
2,4-Dichlorophenol	0.3	µg/L
6:2 Fluorotelomer sulfonic acid(6:2 F	0.01	µg/L
8:2 Fluorotelomer sulfonic acid(8:2 F	0.01	µg/L
a-chlordane	0.008	µg/L
Alachlor	0.1	µg/L
Aldicarb	0.9	µg/L
Aldrin	0.008	µg/L
Ametryn	0.1	µg/L
Atrazine	0.1	µg/L
Atrazine Desethyl	0.1	µg/L
Atrazine+N-Dealkylated Metabolites	0.2	µg/L
Azinphos-methyl	0.1	µg/L
Bendiocarb	0.5	µg/L
Benzo(a)pyrene	0.005	ug/L
Bromoxynil	0.5	µg/L
Carbaryl	0.5	µg/L
Carbofuran	0.5	µg/L
Carbon tetrachloride	0.0005	mg/L
Cesium-137	0.2	Bq/L
Chlorobenzene	0.001	mg/L
Chloroform	0.001	mg/L
Chlorpyrifos	0.1	µg/L
Cyanazine	0.1	µg/L
Cyanide Dissolved	0.002	mg/L
Diazinon	0.1	µg/L
Dibromochloromethane	0.01	mg/L
Dicamba	12	µg/L
Diclofop-methyl	0.1	µg/L
Dieldrin	0.008	µg/L
Dimethoate	0.1	µg/L
Dinoseb	1	µg/L
Diquat	1	µg/L
Diuron	1	µg/L
gamma-hexachlorocyclohexane	0.008	µg/L
g-chlordane	0.008	µg/L
Glyphosate	0.01	mg/L
Gross Alpha	0.09	Bq/L
Gross Beta	0.06	Bq/L
Heptachlor	0.008	µg/L
Heptachlor Epoxide	0.008	µg/L
Iodine-131	0.5	Bq/L
Lead-210	0.02	Bq/L
Malathion	0.1	µg/L
MCPA	0.5	µg/L
Mercury	0.000005	mg/L
Methoxychlor	90	µg/L
Methyl Parathion	0.1	µg/L
Methylene chloride	0.01	mg/L

## 7.18 REPORTABLE DETECTION LIMITS

Analyte	RDL	Unit
Metolachlor	0.1	µg/L
Metribuzin	1	µg/L
NDMA	0.0009	µg/L
Nitrilotriacetic acid	0.2	mg/L
op-DDT	0.004	µg/L
Oxychlorthane	0.008	µg/L
Paraquat	1	µg/L
Parathion	0.1	µg/L
Pentachlorophenol	6	µg/L
Perfluorobutane sulfonic acid (PFBS)	0.01	µg/L
Perfluorobutanoic acid (PFBA)	0.1	µg/L
Perfluoroheptanoic acid (PFHpA)	0.01	µg/L
Perfluorohexane sulfonic acid (PFHx)	0.01	µg/L
Perfluorohexanoic acid (PFHxA)	0.01	µg/L
Perfluorononanoic acid (PFNA)	0.01	µg/L
Perfluorooctane sulfonic acid (PFOS)	0.01	µg/L
Perfluorooctanoic acid (PFOA)	0.01	µg/L
Perfluoropentanoic acid (PFPeA)	0.01	µg/L
Phorate	0.1	µg/L
Picloram	19	µg/L
pp-DDD	0.004	µg/L
pp-DDE	0.004	µg/L
pp-DDT	0.004	µg/L
Prometon	0.1	µg/L
Prometryne	0.1	µg/L
Propazine	0.1	µg/L
Radium-226	0.005	Bq/L
Simazine	0.1	µg/L
Strontium-90	0.05	Bq/L
Sulphide	0.002	mg/L
Temephos	1	µg/L
Terbufos	0.1	µg/L
Terbutryn	0.1	µg/L
Tetrachloroethene	0.001	mg/L
Triallate	0.1	µg/L
Trichloroethene	0.001	mg/L
Trifluralin	0.1	µg/L
Tritium	40	Bq/L
Vinyl chloride	0.001	mg/L

## 7.19 EXPLANATION OF NOTATIONS USED

Concentrations are reported as mg/L unless otherwise indicated.  
Alkalinity and Hardness (Ca and Total) are reported as mg CaCO<sub>3</sub>/L

%T	= % Transmission
- ve	= Absent
+ ve	= Present
µg/L	= Micrograms per litre (1 µg/L = 0.001 mg/L)
µS/cm	= Microsiemens per centimeter (unit of conductivity)
2/Y	= Twice per Year
AO	= Aesthetic Objective
Bq/L	= Becquerel(s) per litre (unit of radionuclide concentration)
CCPP	= Calcium Carbonate Precipitation Potential
CFU	= Colony Forming Units
Comm	= Commercial Laboratories
D	= Daily
EWSI	= EPCOR Water Services Inc.
FPA	= Flavour Profile Analysis
GCDWQ	= Guidelines for Canadian Drinking Water Quality
GM	= Geometric Mean
HPC	= Heterotrophic Plate Count
inoff	= Inoffensive (no objectionable odour)
M	= Monthly
MAC	= Maximum Acceptable Concentration
MDL	= Method Detection Limit
N/A	= Not Available
ND	= Not Detected
NTU	= Nephelometric Turbidity Units
PA	= Presence/Absence Testing
PBR	= Performance Based Rates
PHP	= phenolphthalein
PLPH	= Provincial Laboratory of Public Health
ppb	= Parts Per Billion
ppm	= Parts Per Million
Q	= Quarterly
QA	= Quality Assurance
QC	= Quality Control
RDL	= Reportable Detection Limit
TCU	= True Colour Units
TDS	= Total Dissolved Solids
TOC	= Total Organic Carbon
WL	= Water Laboratory
WTP	= Water Treatment Plant



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Alberta Environment and Parks  
Red Deer-North Saskatchewan Region  
Main Floor, Twin Atria Building  
4999-98 Ave  
Edmonton, Alberta  
T6B 2X3  
Via Email: [Mohammad.M.Rahman@gov.ab.ca](mailto:Mohammad.M.Rahman@gov.ab.ca)

February 25, 2022

**Attention: Mohammad Rahman, P.Eng**  
**EPEA Team Lead**

**Subject: 2022 Notification Distribution Main Extensions – Edmonton Waterworks 638-03-02**

Dear Sir,

EPCOR Water Services Inc. (EWSI) would like to notify Alberta Environment and Parks (AEP) of the extension of the potable water distribution system in 2021. Please accept our assurance that the projects for 2022 will be constructed to meet the design standards in the Alberta Standards & Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems (2021), except for areas as noted below.

Private Development contractors, working under the supervision of EWSI, will undertake the construction of new water main extensions in 2022 for the enclosed list of neighbourhoods for the Edmonton Waterworks (City of Edmonton - Neighbourhood Listing and Neighbourhoods Map). Also enclosed is a map detailing the location of each project currently proposed within the City of Edmonton (2022 Anticipated Development Areas map). Some of these projects may carry over construction into 2023. Additional projects may be added during the 2022 construction season and will be represented as either completed or planned construction as appropriate in the notification to be provided in March, 2023.

On the same neighbourhood list are those neighbourhoods that had construction completion in 2021. Also enclosed is a map detailing the location of each project completed within that year (2021 Completed Development Areas map). We have included the AEP Sign-off Sheet as requested (EPEA Application).

If you have any questions regarding this Extension Notification, please contact me at 780-412-7772 or [dmathew@epcor.com](mailto:dmathew@epcor.com).

Yours sincerely,

A handwritten signature in blue ink that reads "D Mathew". The signature is fluid and cursive, with a long horizontal stroke at the end.

David Mathew, P.Eng  
Manager, Design & Engineering

Enclosure (5)

# EPEA APPLICATION

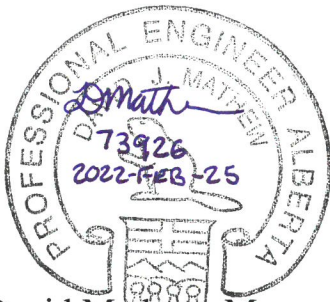
## WATERWORKS, WASTEWATER, OR STORM DRAINAGE SYSTEM

**Project Name/Type**      Private Development

**Location**                      Various throughout the City

**Municipality**                      Edmonton, Alberta

I acknowledge that I have reviewed the *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, April 2012, and certify that the designs of the above noted projects comply with all of the requirements specified for the construction of the water distribution, wastewater collection and storm water collection systems.



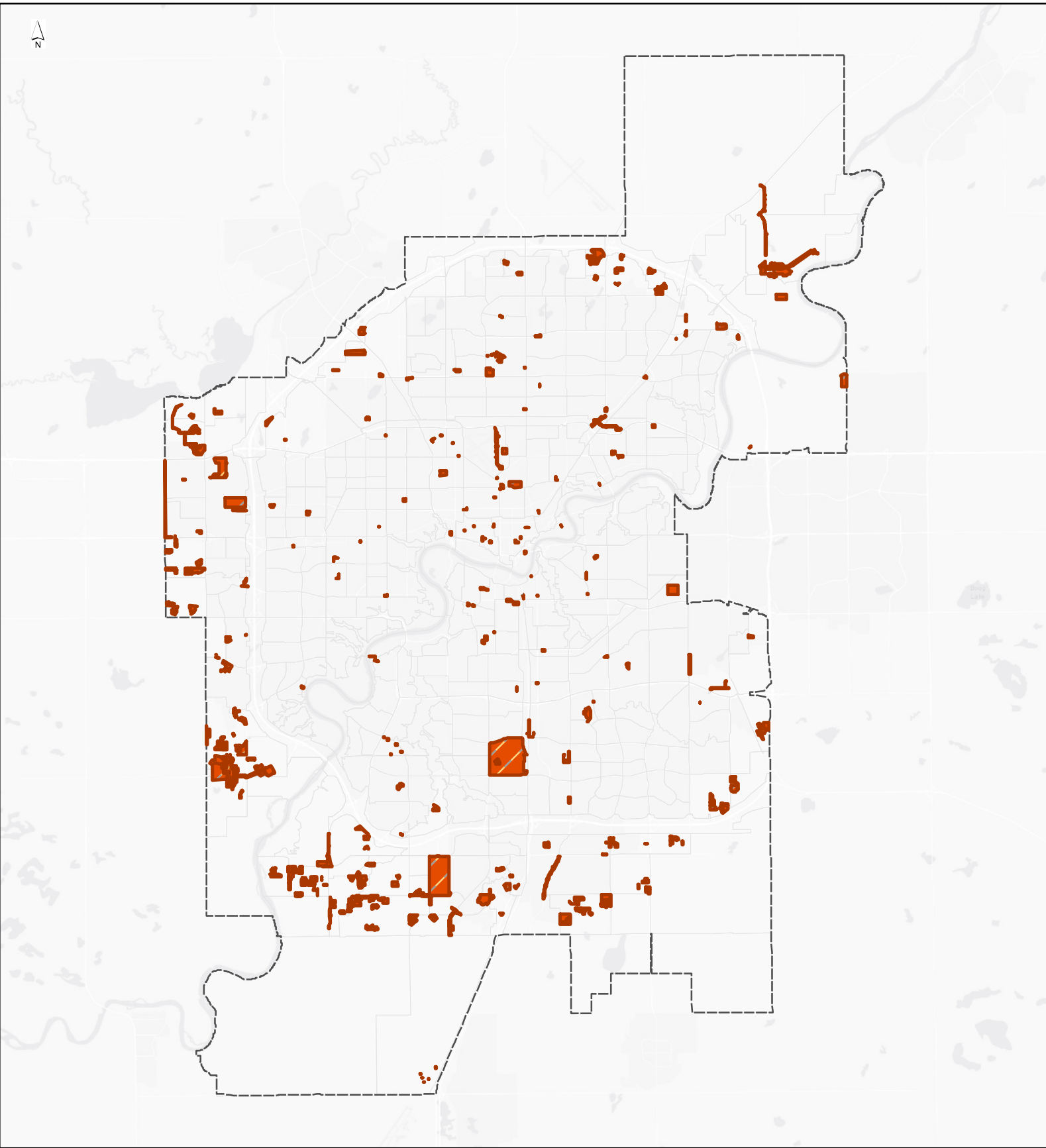
David Mathew; Manager, Design & Engineering  
EPCOR Water Services, Inc.

Submissions that are found to not be in accordance with the Standards and Guidelines may result in enforcement action and/or referral to APEGA.

For projects that do not comply with all of the Standards and Guidelines please submit a detailed explanation of the deficiency and why it is necessary.



# 2022 ANTICIPATED DEVELOPMENT AREAS



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PROVIDING MORE



2021 ANTICIPATED PROJECTS



NEIGHBOURHOODS

## PRIVATE DEVELOPMENT

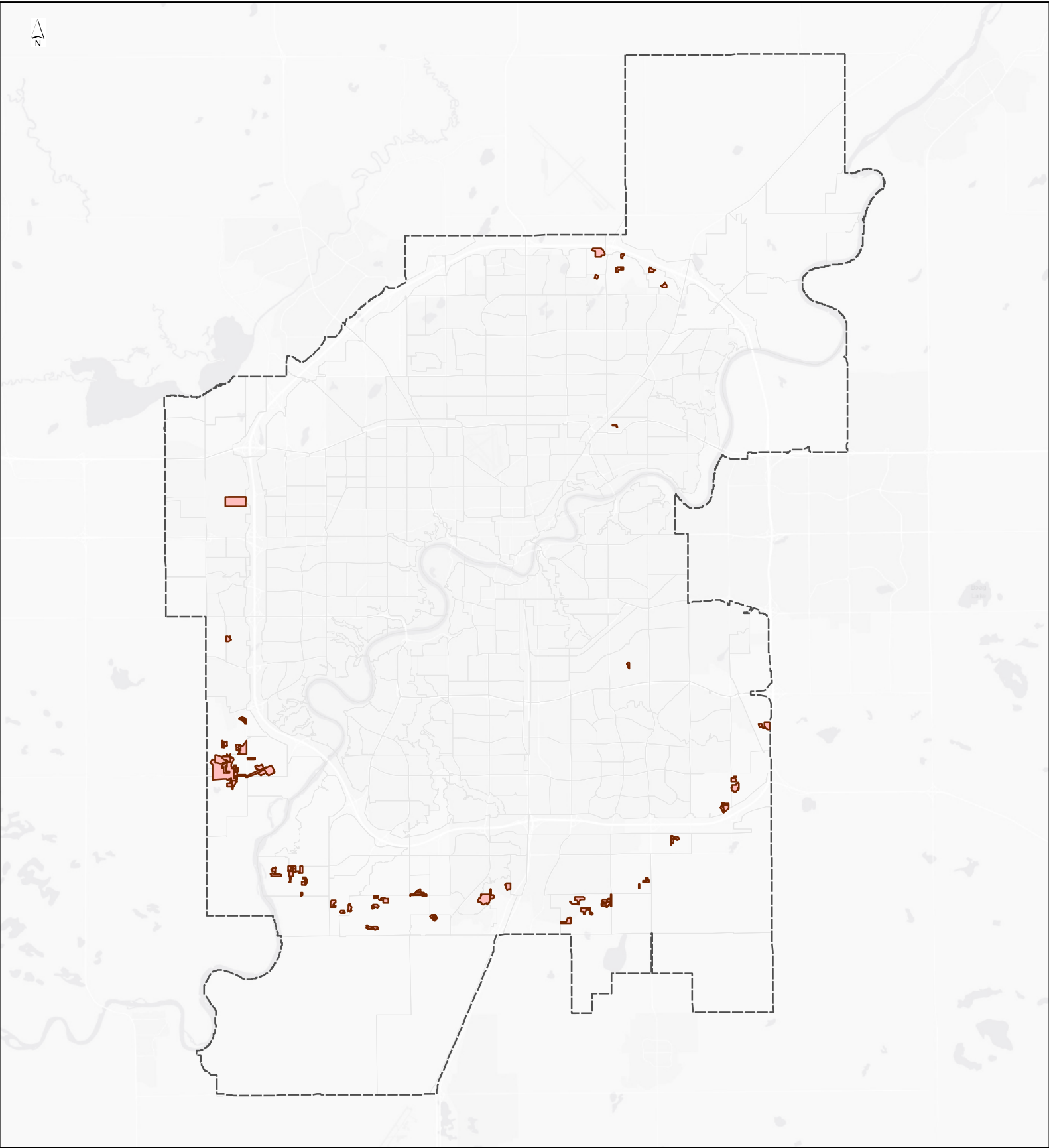
PREPARED BY:

NG

PUBLISH DATE:

18 JANUARY 2022

# 2022 COMPLETED DEVELOPMENT AREAS



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2021 COMPLETED PROJECT



NEIGHBOURHOODS

## PRIVATE DEVELOPMENT

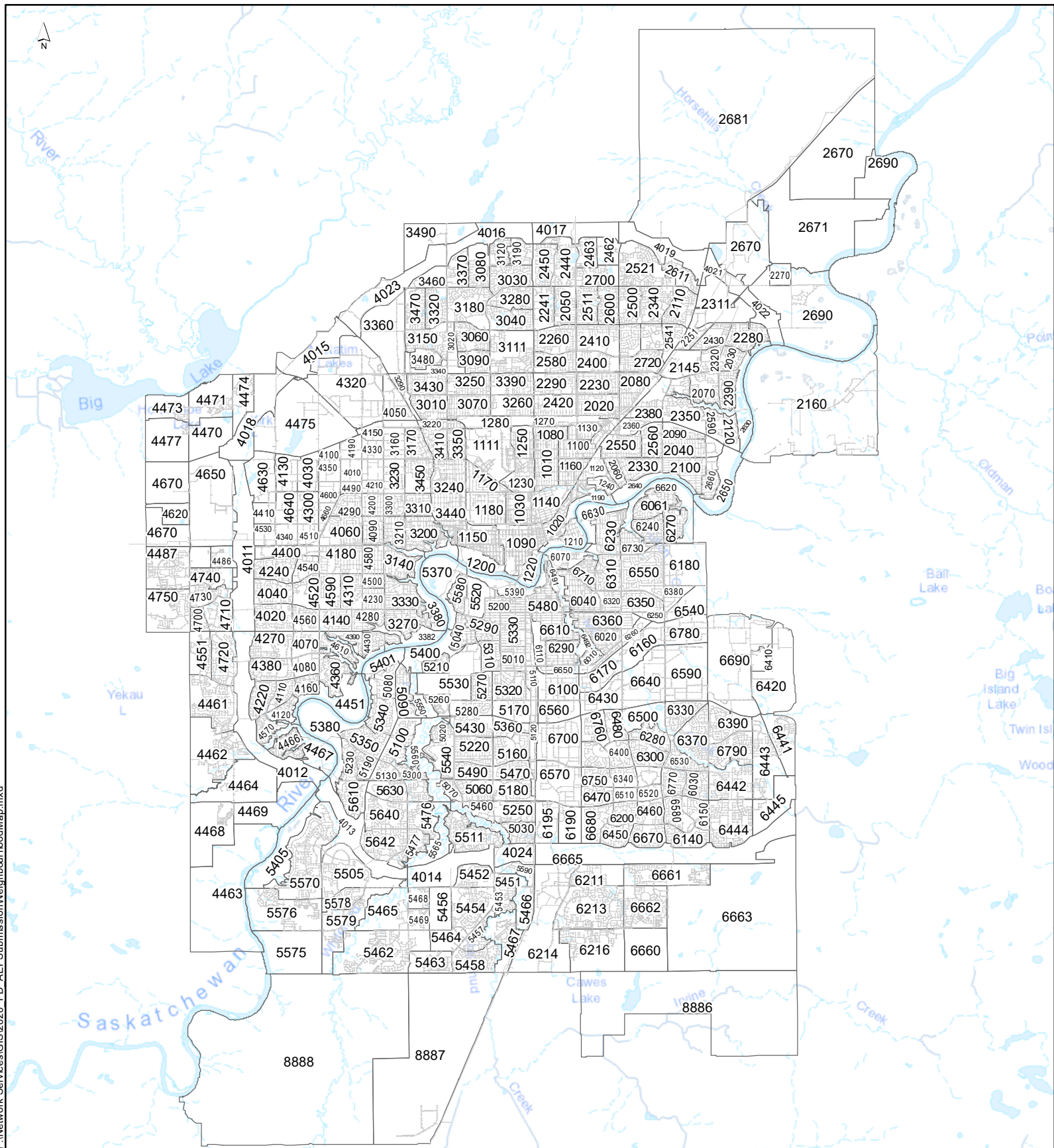
PREPARED BY:

NG

PUBLISH DATE:

18 JANUARY 2022



# NEIGHBOURHOODS



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PROVIDING MORE



-  WATER MAIN
-  NEIGHBOURHOOD

## CITY OF EDMONTON

PREPARED BY:	NG
PUBLISH DATE:	05 MARCH 2021

**City of Edmonton - Neighbourhood Listing**

Number	Neighbourhood Name	Number	Neighbourhood Name	Number	Neighbourhood Name
1010	<i>Alberta Avenue</i>	2690	<i>Rural North East South Sturgeon</i>	4170	Garside Industrial
1020	Boyle Street	2700	<b>Schonsee</b>	4180	<i>Glenwood</i>
1030	<i>Central McDougall</i>	2710	Sifton Park	4190	Hawin Park Estate Industrial
1070	Cromdale	2720	York	4200	High Park
1080	<i>Delton</i>	3010	Athlone	4210	High Park Industrial
1090	<i>Downtown</i>	3020	Baranow	4220	Jamieson Place
1100	<i>Eastwood</i>	3030	Baturyn	4230	Jasper Park
1111	<i>Blatchford Area</i>	3040	Beaumaris	4240	La Perle
1120	Edmonton Northlands	3050	<i>Brown Industrial</i>	4270	Lymburn
1130	Elmwood Park	3060	Caernarvon	4280	Lynnwood
1140	McCaughey	3070	Calder	4290	Mayfield
1150	<i>Oliver</i>	3080	Canossa	4300	<i>McNamara Industrial</i>
1160	<i>Parkdale</i>	3090	<i>Carlisle</i>	4310	Meadowlark Park
1170	<i>Prince Rupert</i>	3111	<i>Griesbach</i>	4320	<i>Mistatim Industrial</i>
1180	<i>Queen Mary Park</i>	3120	Chambery	4330	<i>Mitchell Industrial</i>
1190	River Valley Kinnaird	3140	<i>Crestwood</i>	4340	Morin Industrial
1200	River Valley Victoria	3150	Cumberland	4350	Norwester Industrial
1210	<i>Riverdale</i>	3160	<i>Dominion Industrial</i>	4360	Oleskiw
1220	<i>Rossdale</i>	3170	<i>Dovercourt</i>	4380	Ormsby Place
1230	<i>Spruce Avenue</i>	3180	Dunluce	4390	Patricia Heights
1240	<i>Virginia Park</i>	3190	<i>Elsinore</i>	4400	Place LaRue
1250	<i>Westwood</i>	3200	<i>Glenora</i>	4410	<i>Poundmaker Industrial</i>
1270	<i>Yellowhead Corridor East</i>	3210	<i>Grovenor</i>	4420	Quesnell Heights
1280	<i>Yellowhead Corridor West</i>	3220	Hagmann Estate Industrial	4430	Rio Terrace
2010	Abbottsfeld	3230	Huff Bremner Estate Industrial	4440	River Valley Lessard North
2020	<i>Balwin</i>	3240	<i>Inglewood</i>	4451	River Valley Oleskiw
2030	Bannerman	3250	Kensington	4461	<i>The Hamptons</i>
2040	<i>Beacon Heights</i>	3260	<i>Lauderdale</i>	4462	<i>Edgemont</i>
2050	Belle Rive	3270	Laurier Heights	4463	<i>Riverview Area</i>
2060	Bellevue	3280	<i>Lorelei</i>	4464	<b>The Uplands</b>
2070	Belmont	3290	<i>McArthur Industrial</i>	4466	Cameron Heights
2080	<i>Belvedere</i>	3300	<i>McQueen</i>	4467	River Valley Cameron
2090	<i>Bergman</i>	3310	North Glenora	4468	<b>Stillwater</b>
2100	Beverly Heights	3320	Oxford	4469	<b>River's Edge</b>
2110	Brintnell	3330	Parkview	4470	<i>Rural West Big Lake</i>
2120	Canon Ridge	3340	Pembina	4471	<i>Trumpeter Area</i>
2130	Casselman	3350	<i>Prince Charles</i>	4473	<i>Hawks Ridge</i>
2145	<i>Clareview Town Centre</i>	3360	Rampart Industrial	4474	Starling
2160	<i>Clover Bar Area</i>	3370	Rapperswill	4475	<i>Kinokamau Plains Area</i>
2230	<i>Delwood</i>	3380	River Valley Capitol Hill	4477	Kinglet Gardens
2241	Eaux Claires	3381	River Valley Glenora	4485	Lewis Farms Industrial
2251	<i>Ebbers</i>	3382	River Valley Laurier	4486	Stewart Greens
2260	<i>Evansdale</i>	3390	<i>Roslyn</i>	4487	<i>Secord</i>
2270	Evergreen	3410	<i>Sherbrooke</i>	4490	Sheffield Industrial
2280	<i>Fraser</i>	3430	<i>Wellington</i>	4500	Sherwood
2290	<i>Glengarry</i>	3440	Westmount	4510	Stone Industrial
2311	Gorman	3450	Woodcroft	4520	Summerlea
2320	Hairsine	3460	Albany	4530	Sunwapta Industrial
2330	<i>Highlands</i>	3470	Carlton	4540	Terra Losa
2340	Hollick-Kenyon	3480	Hudson	4551	<b>Granville</b>
2350	Homesteader	3490	Goodridge Corners	4560	Thornclyff
2360	<b>Industrial Heights</b>	4010	Alberta Park Industrial	4570	Wedgewood Heights
2380	Kennedale Industrial	4011	Anthony Henday	4580	West Jasper Place
2390	Kernohan	4012	Anthony Henday South West	4590	<i>West Meadowlark Park</i>
2400	Kildare	4013	Anthony Henday Terwillegar	4600	West Sheffield Industrial
2410	<i>Kilkenny</i>	4014	Anthony Henday South	4610	Westridge
2420	<i>Killarney</i>	4015	Anthony Henday Mistatim	4620	Westview Village
2430	Kirkness	4016	Anthony Henday Castledowns	4630	White Industrial
2440	Klarvatten	4017	Anthony Henday Lake District	4640	Wilson Industrial
2450	Lago Lindo	4018	<i>Anthony Henday Big Lake</i>	4650	<b>Winterburn Industrial Area East</b>
2462	<b>Crystallina Nera East</b>	4019	Anthony Henday Energy Park	4660	Youngstown Industrial
2463	Crystallina Nera West	4020	Aldergrove	4670	<i>Winterburn Industrial Area West</i>
2500	Matt Berry	4021	Anthony Henday Horse Hill	4700	Breckenridge Greens
2511	Mayliewan	4022	Anthony Henday Clareview	4710	Potter Greens
2521	<b>McConachie Area</b>	4023	Anthony Henday Rampart	4720	<i>Glastonbury</i>
2530	McLeod	4024	Anthony Henday South Blackburne	4730	Suder Greens
2541	Miller	4030	Armstrong Industrial	4740	Webber Greens
2550	<i>Montrose</i>	4040	Belmead	4750	<i>Rosenthal</i>
2560	Newton	4050	Bonaventure Industrial	5010	Allendale
2580	Northmount	4060	Britannia Youngstown	5020	<i>Aspen Gardens</i>
2590	Overlanders	4070	Callingwood North	5030	Bearspaw
2600	Ozerna	4080	Callingwood South	5040	Belgravia
2611	<b>Cy Becker</b>	4090	<i>Canora</i>	5050	Blackmud Creek Ravine
2630	River Valley Hermitage	4100	Carleton Square Industrial	5060	Blue Quill
2640	River Valley Highlands	4110	Dechene	5070	Blue Quill Estates
2650	River Valley Rundle	4120	<i>Donsdale</i>	5080	<i>Brander Gardens</i>
2660	Rundle Heights	4130	Edmiston Industrial	5090	Brookside
2670	<i>Rural North East Horse Hill</i>	4140	<i>Elmwood</i>	5100	Bulyea Heights
2671	Marquis	4150	<i>Gagnon Estate Industrial</i>	5110	Calgary Trail North
2681	Edmonton Energy And Technology Park	4160	Gariepy	5120	Calgary Trail South

### City of Edmonton - Neighbourhood Listing

Number	Neighbourhood Name	Number	Neighbourhood Name
5130	Carter Crest	6150	Daly Grove
5151	Strathcona Junction	6160	Davies Industrial East
5160	Duggan	6170	Davies Industrial West
5170	Empire Park	6180	Eastgate Business Park
5180	<i>Ermieskin</i>	6190	Edmonton Research and Development Park
5190	Falconer Heights	6195	South Edmonton Common
5200	<i>Garneau</i>	6200	Ekota
5210	<i>Grandview Heights</i>	6211	<i>Ellerslie</i>
5220	Greenfield	6213	<i>Summerside</i>
5230	Henderson Estates	6214	<i>Ellerslie Industrial</i>
5250	Keheewin	6216	<b>The Orchards At Ellerslie</b>
5260	Lansdowne	6230	<i>Forest Heights</i>
5270	<i>Lendrum Place</i>	6240	Fulton Place
5280	Malmo Plains	6250	Gainer Industrial
5290	<i>McKernan</i>	6260	Girard Industrial
5300	Ogilvie Ridge	6270	Gold Bar
5310	<i>Parkallen</i>	6280	Greenview
5320	<i>Pleasantview</i>	6290	Hazeldean
5330	<i>Queen Alexandra</i>	6300	Hillview
5340	Ramsay Heights	6310	<i>Holyrood</i>
5350	Rhatigan Ridge	6320	Idlywylde
5360	Rideau Park	6330	Jackson Heights
5370	River Valley Mayfair	6340	Kameyosek
5380	River Valley Terwillegar	6350	Kenilworth
5390	River Valley Walterdale	6360	King Edward Park
5400	River Valley Whitemud	6370	Kiniski Gardens
5401	River Valley Fort Edmonton	6380	<i>Lambton Industrial</i>
5405	River Valley Windermere	6390	<i>Larkspur</i>
5430	<i>Royal Gardens</i>	6400	<i>Lee Ridge</i>
5451	Richford	6410	<i>Maple Ridge</i>
5452	MacEwan	6420	Maple Ridge Industrial
5453	Blackmud Creek	6430	<i>McIntyre Industrial</i>
5454	<i>Rutherford</i>	6441	<b>Maple</b>
5456	<i>Heritage Valley Area</i>	6442	Silver Berry
5457	Callaghan	6443	Tamarack
5458	Allard	6444	<b>Laurel</b>
5460	Skyrattler	6445	<b>Aster</b>
5462	<b>Chappelle Area</b>	6450	Menisa
5463	<b>Desrochers Area</b>	6460	Meyokumin
5464	Heritage Valley Town Centre Area	6470	Meyonohk
5465	<i>Hays Ridge Area</i>	6480	<i>Michaels Park</i>
5466	<i>Cashman</i>	6491	<i>Mill Creek Ravine North</i>
5467	<b>Cavanagh</b>	6492	<i>Mill Creek Ravine South</i>
5468	Graydon Hill	6500	Mill Woods Golf Course
5469	<b>Paisley</b>	6510	Mill Woods Park
5470	Steinhauer	6520	Mill Woods Town Centre
5476	Magrath Heights	6530	Minchau
5477	<i>Mactaggart</i>	6540	<i>Morris Industrial</i>
5480	<i>Strathcona</i>	6550	<i>Ottewell</i>
5490	Sweet Grass	6560	Papaschase Industrial
5505	<i>Ambleside</i>	6570	Parsons Industrial
5511	Twin Brooks	6580	Pollard Meadows
5520	University of Alberta	6590	Pylypow Industrial
5530	University of Alberta Farm	6600	Richfield
5540	Westbrook Estates	6610	<i>Ritchie</i>
5550	Whitemud Creek Ravine North	6620	River Valley Gold Bar
5560	Whitemud Creek Ravine South	6630	River Valley Riverside
5565	<i>Whitemud Creek Ravine Twin Brooks</i>	6640	<b>Roper Industrial</b>
5570	Windermere	6650	<i>Rosedale Industrial</i>
5575	Windermere Area	6660	Rural South East
5576	<b>Keswick Area</b>	6661	<b>Charlesworth</b>
5578	<b>Glenriding Heights</b>	6662	<b>Walker</b>
5579	<b>Glenriding Ravine</b>	6663	<i>Decoteau</i>
5580	Windsor Park	6665	Anthony Henday South East
5590	Blackburne	6670	Sakaw
5610	Haddow	6680	Satoo
5620	Hodgson	6690	<i>Southeast Industrial</i>
5630	Leger	6700	<i>Strathcona Industrial Park</i>
5640	Terwillegar Towne	6710	<i>Strathearn</i>
5642	South Terwillegar	6720	Tawa
6010	Argyll	6730	Terrace Heights
6020	Avonmore	6750	Tipaskan
6030	Bisset	6760	<i>Tweddle Place</i>
6040	<i>Bonnie Doon</i>	6770	Weinlos
6061	Capilano	6780	Weir Industrial
6070	Cloverdale	6790	Wild Rose
6090	<i>Coronet Addition Industrial</i>	8886	Edmonton South East
6100	Coronet Industrial	8887	Edmonton South Central
6110	CPR Irvine	8888	Edmonton South West
6140	Crawford Plains		

# **Residuals Management Program**

**Rossdale and E.L. Smith Water Treatment Plants and  
Edmonton's Water Distribution System**

**Annual Progress Report**

**Prepared for Alberta Environment and Parks**

**EPEA Approval 638-04-00**



**PROVIDING MORE**

**EPCOR WATER SERVICES INC.**

**February 2022**



## Approval



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**Director, Edmonton WTPs, Audrey Cudrak**

February 8, 2022

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**Date**



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**DVP, Operations, Quality Assurance and  
Environment, Christopher Ward**

February 9, 2022

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**Date**

## Executive Summary

EPCOR has committed to reduce the impact of water treatment plant residuals released to the North Saskatchewan River, a commitment now formalized in the system's Approval issued under the *Environmental Protection and Enhancement Act* (Approval 638-04-00). This report summarizes activities and progress made against those commitments and challenges faced in 2021. The Process Innovation and Residuals Committee's (PIRC) main focus is to promote environmental excellence and stewardship by minimizing environmental impacts through the management of residuals, discussing new research developments and resolving issues related to the water treatment processes.

EPCOR has essentially eliminated release of chlorinated water from all parts of the system (WTPs, storage, water distribution and transmission) where feasible and practical. Our focus now is monitoring and continuous improvements. The Sodium Bisulfite (SBS) dechlorination systems at the Edmonton Water Treatment Plants (EWTPs) continued to operate as intended. A major upgrade project was completed for SBS room in 2021 at Rosedale. There was no chlorinated water release in 2021 for EWTPs and reservoirs.

As stated in the Approval, EPCOR's main strategy for reducing solids discharges is to operate in Direct Filtration (DF) during the winter months. EWTPs convert to DF during the fall and winter months to further reduce chemical addition and subsequent solids discharges to the river. EWTPs achieved an average of 131 days of DF operations at both plants in 2021, exceeding the internal 120 day target for DF operation. In 2021, in DF, the total solids reduction during the winter months (January -February and November-December) was 52%. The solid reductions during extended DF operation were 38%. Overall, in 2021, total solids discharged to the NSR were reduced by 13.4%, as compared to baseline conventional operation due to dry weather and stable raw water conditions. The frequency of monitoring *Giardia* and *Cryptosporidium* in raw and treated water increased while transitions to DF operation took place but neither parasite was detected in treated water samples in 2021 while in DF.

EPCOR is making progress on the Deep Bed Filter Conversion project, which will help to extend DF operation at the E. L. Smith WTP. A structural rehabilitation program is underway for Stage 1 filters (filters 1 to 6). Stage 2 (filters 7 to 12) filter rehabilitation work will follow after Stage 1 work is completed. Filter 3 - structural rehabilitation work was completed in 2021. Filter 1 and Filter 2 rehabilitation work commenced in 2021 and will be completed by July 2022. This structural rehabilitation program is necessary for deep bed filtration implementation.

EPCOR continued to assess the impacts of residuals to the NSR by generating a better estimate of TSS load, dissolved aluminum and total metals from the WTPs, and determining the extent and duration of the exceedances of instream guidelines through a mass balance approach. To improve the ability to calculate loads, EPCOR developed a proposed Wastestream Monitoring Program, submitted to AEP in December 2021, that will include installing flow monitoring equipment and autosamplers on select wastestreams. The monitoring equipment, along with the results from the Wastestream Monitoring Program, will assist in the calculation of loads and the assessment of both near-field and far-field impacts of WTP discharges on the NSR.

EPCOR is evaluating various options for trial of ballasted clarification including micro Actiflo® unit trial followed by a pilot plant trial for different river water conditions. Recommendations from the jar test study (2020) included conducting pilot trials to test Actiflo® process during seasons when the raw water



is high in turbidity and colour. These trials are tentatively scheduled for the latter part of current PBR (2022 to 2026). The trial will include a Twin Carb unit with recirculation of carbon.

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## 1 Introduction

In 2005, EPCOR initiated the Residuals Management Program (RMP) to address Alberta Environment and Parks' proposed limits for discharges to the North Saskatchewan River (NSR). This included discharges from the Edmonton water treatment plants and distribution system. In 2021, EPCOR's commitments in this area were formalized in the system's Approval issued under the *Environmental Protection and Enhancement Act* (Approval no 638-04-00), here after referred to as Approval.

Section 4.5 of the Approval states EPCOR "...shall strive to reduce the impact of water treatment plant residual streams released to the North Saskatchewan River through a long-term residuals management program of continuous improvement..."

EPCOR's Process Innovation and Residuals Committee, comprising a cross-section of water treatment subject matter experts, meets monthly. The focus of this committee is to promote environmental excellence and stewardship by minimizing environmental impacts through the management of residuals, discussing new research developments and resolving issues related to the water treatment processes.

This document outlines the progress and status of the work done by EPCOR in managing residuals discharges for 2021.

## 2 Residuals Management Improvements

### 2.1 Dechlorination Update

#### **Edmonton Water Treatment Plants:**

Sodium Bi-Sulfite (SBS) based dechlorination systems have been in operation at E.L. Smith WTP and Rossdale WTP since 2009 and 2012, respectively.

As of November 2021, construction and commissioning has been completed on an upgraded SBS system at Rossdale. Project construction began in 2019 and was completed while the existing system was kept running. The project included addressing SO<sub>2</sub> off gassing concerns, operability and accessibility concerns, upgrading HVAC and adding an emergency backup dechlorination system. Remaining minor project deficiencies will be addressed in Q1 of 2022

In 2021, there were no incidents at Rossdale WTP or E.L. Smith WTP resulting in the release of chlorinated water into the North Saskatchewan River.

#### **Reservoir and Distribution System Dechlorination Update:**

Procedures are in place for dechlorinating all planned releases of chlorinated water from the field reservoirs (i.e. during draining) and the distribution system (i.e. during flushing). Procedures are also in place for dechlorinating water released during unplanned events (i.e. main breaks), although the priority is to investigate and stop the source of leaking water as soon as possible.

Significant releases of chlorinated water directly to watercourses due to main breaks or other events are reported to the AEP emergency hotline. There were no chlorinated release incidents in the reservoirs and distribution system in 2021.

### 2.2 Direct Filtration Operations Update

Provided that the river water quality allows the conversion from conventional treatment, Rossdale and E.L. Smith water treatment plants operate in the direct filtration (DF) mode during the late fall and winter months. This operation mode aims to reduce solids (including aluminium) discharged to the NSR.

Table 1 summarizes the differences in chemical dosage between conventional and DF operation during low raw water Colour and Turbidity conditions (<8 TCU, <10 NTU). DF treatment uses less overall chemical compared to conventional treatment. DF operation has successfully reduced alum usage by approximately 75% compared to conventional mode. Thus, the total mass of solid treatment residuals discharged to the NSR is reduced by approximately 50% during the DF operation period.

**Table 1: Chemical Dose comparison in Conventional and Direct Filtration during Fall/Winter operation**

<b>Chemical</b>	<b>Conventional</b>	<b>Direct Filtration</b>
Alum	25 – 30 mg/L	< 10 mg/L
Primary Polymer	0.2 – 0.3 mg/L	0 – 0.1 mg/L
Filter Polymer	0.2 – 0.5 mg/L	0.4 to 0.7 mg/L
Caustic Soda	0 – 2.8 mg/L	0

EPCOR has continuously made improvements to DF operation that would enable DF operation for longer periods during the year. Ongoing trials and investigations to reduce residuals are highlighted in Section 5 of this report.

As per the Approval, EPCOR’s main strategy for reducing solids to the river is to operate in Direct Filtration between November and February. When the WTPs are operated in DF outside the months of November/December/January/February, this period is considered as Extended DF. Over the past several years, the year-to-year results have been variable and have depended highly on raw water conditions and other variables. EPCOR has now set a KPI target to operate in DF for a period of at least 120 days in a year. In 2021, the WTPs were able to achieve an average of 131 days in DF (130 days at Rossdale and 132 days at E.L. Smith).

**Conversion dates for 2021:**

The Rossdale WTP was in DF operation on January 1<sup>st</sup>, 2021 and converted back to conventional treatment on March 13<sup>th</sup>, 2021, in preparation for spring run-off in the NSR. Later in the year, Rossdale was converted to DF on November 3<sup>rd</sup>; and remained in DF for the rest of 2021.

The E.L. Smith WTP was in DF operation on January 1<sup>st</sup>, 2021 and converted back to conventional treatment on March 13<sup>th</sup>, 2021, in preparation for spring run-off in the NSR. Later in the year, Rossdale was converted to DF on November 1<sup>st</sup>; and remained in DF for the rest of 2021.

**2.3 Residuals Reduction**

Optimization of alum dosing strategy has been a primary focus over the past few years at EPCOR since reduction in alum dosage results in a reduction of chemical residuals produced and discharged to the NSR. Alum dose is reduced through DF and extended DF operation as explained in Section 2.2. Optimal alum dosages are applied in conventional treatment operation based on a dosing model that was developed in-house. The use of this model has resulted in lower alum dosages than historically used to treat raw water of similar quality. This model was optimized in 2017 to include a temperature correction factor.

Suspended solids and dissolved organics concentrations in the NSR, measured as turbidity and color, were historically low throughout 2021, reducing treatment chemical use and residuals discharged.

In 2021, DF operation resulted in a reduction of total solids discharged to the NSR by 52.0% during the months of January, February, November, and December compared to baseline conventional operation. In 2021, both plants operated several days in DF in March. During this Extended DF period, the total solids reduction was 38.0% compared to baseline conventional operation.

Table 2 and Table 3 below summarize total suspended solids loading to the river in 2020 and 2021, respectively.

**Table 2: Total Suspended Solids Discharged to the NSR in 2020**

Mode of Operation	Months	Actual Total Solids Loading (tonne)	Chemical Loading (tonne)	Baseline Total Solids Loading [Conventional Model]* (tonne)	Total Solids Loading Reduction (tonne)	Total Solids Loading Reduction (%)
Direct Filtration (DF)	Jan-Feb, Nov-Dec	683	325	1,206	522	43.3%
Extended DF	Mar-Apr, Sep-Oct	281	103	567	286	50.4%
Chemical Optimization	Mar-Oct	16,972	4,922	17,229	257	1.5%
Total		17,936	5,351	19,002	1,065	5.6%

**Table 3: Total Suspended Solids Discharged to the NSR in 2021**

Mode of Operation	Months	Actual Total Solids Loading (tonne)	Chemical Loading (tonne)	Baseline Total Solids Loading [Conventional Model]* (tonne)	Total Solids Loading Reduction (tonne)	Total Solids Loading Reduction (%)
Direct Filtration (DF)	Jan-Feb, Nov-Dec	461	133	961	500	52.0%
Extended DF	Mar	31	14	51	19	38.0%
Chemical Optimization	Mar-Oct	5302	1982	5679	378	6.7%
Total		5794	2129	6691	898	13.4%

Note for Table 2 and 3: Total suspended solids discharges are calculated based on a predictive model that accounts for raw water turbidity and colour and chemical dosing. Both are continuously monitored. Reductions in loading are calculated compared to the historical conventional operating strategy and 2005-2010 baseline data\*. For extended DF, only the days when the WTPs were in DF were used.

### 3 Impact of Residuals Management on Water Quality

#### 3.1 Effects of Direct Filtration on Treated Water Quality

Treated water quality during DF operation in 2021 was compared with baseline quality observed during a ten-year period of conventional winter operation (2001 – 2010). Favorable raw water quality conditions during 2021 allowed DF operation to proceed between January and mid-March and to resume by early November, so that the total number of DF days was 133 at E. L. Smith and 131 days at Rosedale.

Filter effluent quality comparisons between historic conventional operation and 2021 DF operation are shown in Table 4. Average daily values and standard deviations are shown for seven parameters: turbidity, particle counts (PC>2µm), total aluminum (Total Al), UV254 transmittance (UV%T), total organic carbon (TOC), and two groups of disinfection by-products (TTHM and HAA5). Turbidity, particle counts and UV%T values were measured with on-line filter effluent analyzers, whereas Total Al, TOC, TTHM and HAA5 values were lab-measured values for treated reservoir samples. As usual, slight decreases in UV%T and small increases in Total Al, TOC, TTHM and HAA5 were observed. These differences are expected because of reduced coagulant use and do not represent a reduction in treated water quality because the parameters remained well within established target ranges.

**Table 4: Treated Water Quality Comparison: Former Winter Conventional vs. 2021 DF Operation**

Parameter	EPCOR Target	ELS Conv. 2001-2010		ELS DF 2021		ROS Conv. 2001-2010		ROS DF 2021	
		Mean	St Dev	Mean	St Dev	Mean	St Dev	Mean	St Dev
Turbidity*	< 0.10 NTU	0.027	0.005	0.032	0.005	0.024	0.007	0.031	0.005
PC >2µm*	< 20/mL	6.0	3.3	6.3	2.1	3.6	3.4	4.0	1.0
Total Al	< 0.20 mg/L	0.041	0.013	0.097	0.013	0.036	0.015	0.083	0.025
UV <sub>254</sub> T %*	> 90%	96.2	1.2	94.6	1.4	95.9	1.0	94.7	1.4
TOC (mg/L)	No target	1.19	0.33	1.24	0.28	1.23	0.34	1.27	0.26
TTHM	< 40 µg/L	6.30	2.56	9.57	2.58	8.35	3.04	12.33	3.09
HAA5	< 35 µg/L	11.1	5.3	15.7	3.8	13.5	5.7	18.1	4.2

\*Parameters measured in filter effluent rather than in the treated water reservoir

#### 3.2 Risk Analysis of *Cryptosporidium* during DF

Biweekly assays for *Giardia* and *Cryptosporidium* were performed on samples of raw and treated water from both WTPs during periods of DF operation. During Q1, concentrations of both parasites were consistently near or below levels of detection. During the fall, higher concentrations (especially for *Giardia*) were measured in raw water samples and the monitoring frequency was increased to weekly during October while Operations staff were considering a suitable time to start DF. Whereas the maximum reported *Giardia* concentration in raw water was 600 cysts/100 L, the maximum for *Cryptosporidium* was

only 14.3 oocysts/100 L. After DF was implemented at the beginning of November, the counts for both parasites declined rapidly and *Cryptosporidium* levels were once again near or below the level of detection in raw water samples. No oocysts were detected in treated water samples.

## 4 Environmental Impacts of Residuals Discharges

### 4.1 Residuals Characterization and Effluent Toxicity Summary

Clarifier and filter waste streams were sampled quarterly from locations as close as practical to river discharge points. Samples were characterized by the Process Development Team, and 96-hour trout assays were conducted to evaluate acute toxicity. Initial DO concentrations were measured and checks were made to ensure that no residual chlorine was present. Results are shown in Table 5. All samples were reported as non-toxic (LC50 > 100%).

**Table 5: Toxicity sampling and results for Wastestreams from EWTPs**

Date	Operating Mode	Sample Description	TSS (mg/L)	pH	TOC (mg/L)	LC50
16-Feb-21	Direct Filtration	ELS Clarifier Waste	281	7.72	3.2	>100%
16-Feb-21	Direct Filtration	ELS Filter Waste	<5	7.91	2.8	>100%
17-Feb-21	Direct Filtration	Rossdale WS 3 Filter Waste	<5	7.59	3.0	>100%
17-Feb-21	Direct Filtration	Rossdale WS 6 Clarifier Waste	7	7.79	2.9	>100%
17-Feb-21	Direct Filtration	Rossdale WS7	<5	7.82	2.7	>100%
25-May-21	Conventional	Rossdale WS 3 Filter Waste	29	7.82	5.6	>100%
25-May-21	Conventional	Rossdale WS 5 Clarifier Waste	72	8.40	5.9	NA*
25-May-21	Conventional	Rossdale WS 6 Clarifier Waste	1013	7.57	7.2	> 100%
25-May-21	Conventional	Rossdale WS7	5	8.15	3.0	> 100%
27-May-21	Conventional	ELS Clarifier Waste	100550	7.19	4.5	>100%
27-May-21	Conventional	ELS Filter Waste	<5	7.67	2.8	>100%
30-Aug-21	Conventional	ELS Clarifier Waste	39000	7.30	0.0	>100%
30-Aug-21	Conventional	ELS Filter Waste	5	7.35	7.5	> 100%
31-Aug-21	Conventional	Rossdale WS 3 Filter Waste	82	7.15	2.2	> 100%
31-Aug-21	Conventional	Rossdale WS 5 Clarifier Waste	11	8.15	1.6	> 100%
31-Aug-21	Conventional	Rossdale WS 6 Clarifier Waste	10,700	7.60	5.2	> 100%
31-Aug-21	Conventional	Rossdale WS 7	0.44	7.58	1.4	> 100%
25-Oct-21	Conventional	ELS Clarifier Waste	16350	7.36	11.1	> 100%
25-Oct-21	Conventional	ELS Filter Waste	<5	7.53	1.7	> 100%



26-Oct-21	Conventional	Rossdale WS 3 Filter Waste	10	7.65	1.8	> 100%
26-Oct-21	Conventional	Rossdale WS 5 Clarifier Waste	28	8.19	2.1	> 100%
26-Oct-21	Conventional	Rossdale WS 6 Clarifier Waste	9767	7.54	3.7	> 100%
26-Oct-21	Conventional	Rossdale WS 7	6.6	7.64	1.7	> 100%

#### 4.2 Measuring Near-Field Impacts of WTP discharges

EPCOR has conducted a variety of monitoring programs to assess the environmental impacts of WTP residual wastestreams to the North Saskatchewan River (NSR) since 2013. Through this process, a better understanding of the characteristics of residual discharges was gained, and monitoring was adjusted accordingly. Previous work has included monitoring water quality, sediment quality, benthic invertebrate communities and conducting chronic toxicity tests on residual discharges.

In 2021, EPCOR’s focus was to better understand the characteristics of the six wastestream discharges in different operational modes and raw water conditions. The intention was to better estimate the loads of TSS, dissolved aluminum and total metals from the WTPs and determine the extent and duration of exceedances of instream guidelines through a mass balance approach. Water quality results from wastestream samples collected in 2020 and 2021 were evaluated, and it was determined that the concentrations of these parameters were highly variable, even among samples collected during similar operational and NSR water quality conditions. EPCOR also explored the WTP’s current ability to monitor flows in the wastestreams, and determined that they were insufficient to allow for the calculation of loads. Most notably, as the WTPs discharge loads intermittently though the day, and do not remain consistent through the year, it is essential to be able to calculate instantaneous flow rates, and not daily estimates of flow. Due to these challenges of calculating loads, EPCOR developed a proposed Wastestream Monitoring Program that will install flow monitoring equipment and autosamplers on wastestreams that discharge clarifier waste at the E.L. Smith and Rossdale WTPs. The monitoring equipment, along with the results of the Wastestream Monitoring Program, will assist in the calculation of loads and the assessment of both near-field and far-field impacts of WTP discharges on the NSR. Details of this monitoring program were provided to AEP as prescribed in Section 4.5.2 of the EPCOR Waterworks Approval.

## 5 Process Development Initiatives

The Process Development Team (PDT) continued to explore opportunities to reduce alum use and the associated production of alum residuals. Additional pilot-scale trials were conducted to demonstrate that deep bed filters provide more robust performance during challenging raw water conditions, allowing earlier transitions to DF. Deep bed filters also provide substantially longer run times, resulting in less frequent backwashes and a lower ratio of filter waste per volume of treated water. Preliminary investigations were conducted to explore the possibility of recycling filter waste during ripening (filter-to-waste) by returning it to a point upstream of clarifiers. This would directly reduce the volume of filter waste discharged to the river and the associated dechlorination requirements. The possibility of recycling water from the later stages of filter backwashes will also be considered.

EPCOR has continued to work with WTP Engineering on plans for pilot testing ballasted floc clarification in PBR period 2022-26. Pilot trials with Actiflo® will include evaluating the effects of process variables on the volume and characteristics of treatment residuals.

## 6 Strategy for Moving Forward

The Approval requirements commits EPCOR to pursue continuous improvement of the residuals management to the North Saskatchewan River and to explore opportunities to further reduce solids loading outside of the November to February winter period. EPCOR's strategy moving forward will continue to emphasize operation of the water treatment plants in direct filtration mode during the fall and winter months when it is practically feasible and the environmental benefits are greatest. EPCOR, has now set a KPI to provide DF for a period of at least 120 days in a year. This target is formalized under the 2022 - 2026 Performance Based Rates agreement with the City of Edmonton. Failure to meet this target could result in financial penalties to EPCOR.

EPCOR is planning to implement the Deep Bed Filters (DBF) Conversion project at EL Smith plant to improve filter performance in Direct Filtration. A structural rehabilitation program is in place to address the structural issues with the filters in stages 1 and 2. This phase must be completed prior to initiating the Deep Bed Filter project. As of 2021, filter #3 upgrades were complete. Filters #1 and #2 are in construction phase, and are expected to be commissioned by July 2022.

In 2022, EPCOR will focus on investigating solutions to accurately measure the waste stream flows from clarifier discharges to the river. This will allow EPCOR to better monitor the solids loading and study effects of concentrated residuals to the river.

## 7 Appendix

### 7.1 A-1 Chronological List of Meetings and Document Exchanges between EPCOR and AEP, 2021

Date	Meeting Description	Document Description
April 15 2021	Edmonton Waterworks teleconference with AEP to discuss items in draft Approval. Depressurization, CT calculations and Turbidity limits were main topics.	Minutes with Action Items and next draft of Approval.
October 8, 2021	Teams/Teleconference meeting with AEP on August 26, 2021 Edmonton Waterworks amendment application. Discussion on removal of several parameters from Schedule 3 (pH, Temperature, flow), clarification of combined vs. total chlorine residual in approval, and clauses related to UV dose in Section 4 of approval.	Email follow-up to meeting.
November 23, 2021	<p>Purpose: The current approval for the Edmonton Waterworks System (638-04-00) stipulates that EPCOR will develop a waste stream monitoring program and assessment of impacts of wastes to the North Saskatchewan River in consultation with AEP and submit to the Director by December 31, 2021. A draft proposal of this monitoring program has been completed and EPCOR would like to present an overview of the proposal and answer any initial questions AEP may have</p> <p>Agenda:</p>	

	<ol style="list-style-type: none"> <li>1. Introductions</li> <li>2. EPCOR Presentation on proposal for Waste Stream Monitoring Program</li> <li>3. Discussion</li> <li>4. Next Steps</li> </ol> <p>Attendees: Mohammad Rahman (AEP), Fengqin Wang (AEP), Geoff Heise (EPCOR), Steph Neufeld (EPCOR), Jamie Gingrich (EPCOR)</p>	
December 3, 2021	<p>Presented overview of proposed waste stream monitoring program to Claire Classen, Limnologist/Water Quality Specialist with AEP.</p> <p>Attendees: Claire Classen (AEP), Steph Neufeld (EPCOR), Mike Christensen (EPCOR)</p>	