Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 19-18

TUNNEL AND RESERVOIR PLAN

THORNTON TRANSITIONAL FLOOD CONTROL

RESERVOIR AND WELLS

ANNUAL GROUNDWATER MONITORING REPORT

FOR 2018

JULY 2019

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July 26, 2019

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Dear Sir or Madam:

Subject: Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir and Wells, Annual Groundwater Monitoring Report for 2018

Attached are three copies of "Tunnel and Reservoir Plan, Thornton Transitional Flood Control Reservoir and Wells, Annual Groundwater Monitoring Report for 2018."

Very truly yours,

Albert E. Cox
Environmental Monitoring and Research Manager
Monitoring and Research Department

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TUNNEL AND RESERVOIR PLAN
THORNTON TRANSITIONAL FLOOD CONTROL RESERVOIR AND WELLS
ANNUAL GROUNDWATER MONITORING REPORT
FOR 2018

Monitoring and Research Department
Edward W. Podczerwinski, Director

July 2019

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LIST OF ABBREVIATIONS

°C	degrees Celsius
Ag	silver
As	arsenic
B	boron
Ba	barium
BG	billion gallons
BOD_5	five-day biochemical oxygen demand
Cd	cadmium
CFU	colony forming unit
Cl^-	chloride
CN^-	cyanide
Cr	chromium
CSF	combined sewer flow
Cu	copper
EC	electrical conductivity
F^-	fluoride
FC	fecal coliform
Fe	iron
ft	feet
Hg	mercury
IEPA	Illinois Environmental Protection Agency
L	liter
m	meter
mg	milligram
MG	million gallons
mL	milliliter
Mn	manganese
mS	millisiemen
NH_3-N	ammonia nitrogen
Ni	nickel
Pb	lead
SO_4^{2-}	sulfate
SOW	scope of work
TCR	Thornton Composite Reservoir
TDS	total dissolved solids
Temp	temperature
TTR	Thornton Transitional Reservoir

ANNUAL DATA FOR MONITORING WELLS AND THORNTON TRANSITIONAL RESERVOIR

Introduction

This report is submitted annually to fulfill the reporting requirements of the Illinois Environmental Protection Agency (IEPA) regarding the utilization of the Thornton Transitional Reservoir (TTR) for flood control. The reporting requirements, stated in Section 7 of the Scope of Work (SOW) approved by the IEPA on August 6, 2001, and modified May 9, 2005, for Groundwater Quality Monitoring of the Reservoir and adjacent wells include:

1. Analytical data for the monitoring wells and transitional reservoir for the previous year.

2. Review and comparison of analytical data for the monitoring wells with calculated statistical limits for previously analyzed background samples in order to evaluate exceedances in the concentrations of analytes.

Project Description

The Reservoir is located in the West Lobe of the Thornton Quarry, southeast of the intersection of the Tri-State Tollway and Halsted Street in Thornton, Illinois (Figure 1). The Reservoir was the final structure to be implemented for the Little Calumet River Watershed under the Natural Resources Conservation Service Little Calumet Watershed Plan of November 1998. The Reservoir provides 3.7 billion gallons (BG) of floodwater storage, increased from the original volume of 3.1 BG due to additional rock mining. This provides sufficient volume to capture a 100-year storm event from Thorn Creek at a point just south of the Tri-State Tollway. This project provides flood control benefits for 21 businesses and 4,400 residences. Within the Little Calumet watershed are the Illinois communities of Blue Island, Calumet City, Dixmoor, Dolton, Glenwood, Harvey, Lansing, Phoenix, Riverdale, and South Holland, which all benefit from the implemented flood control measures.

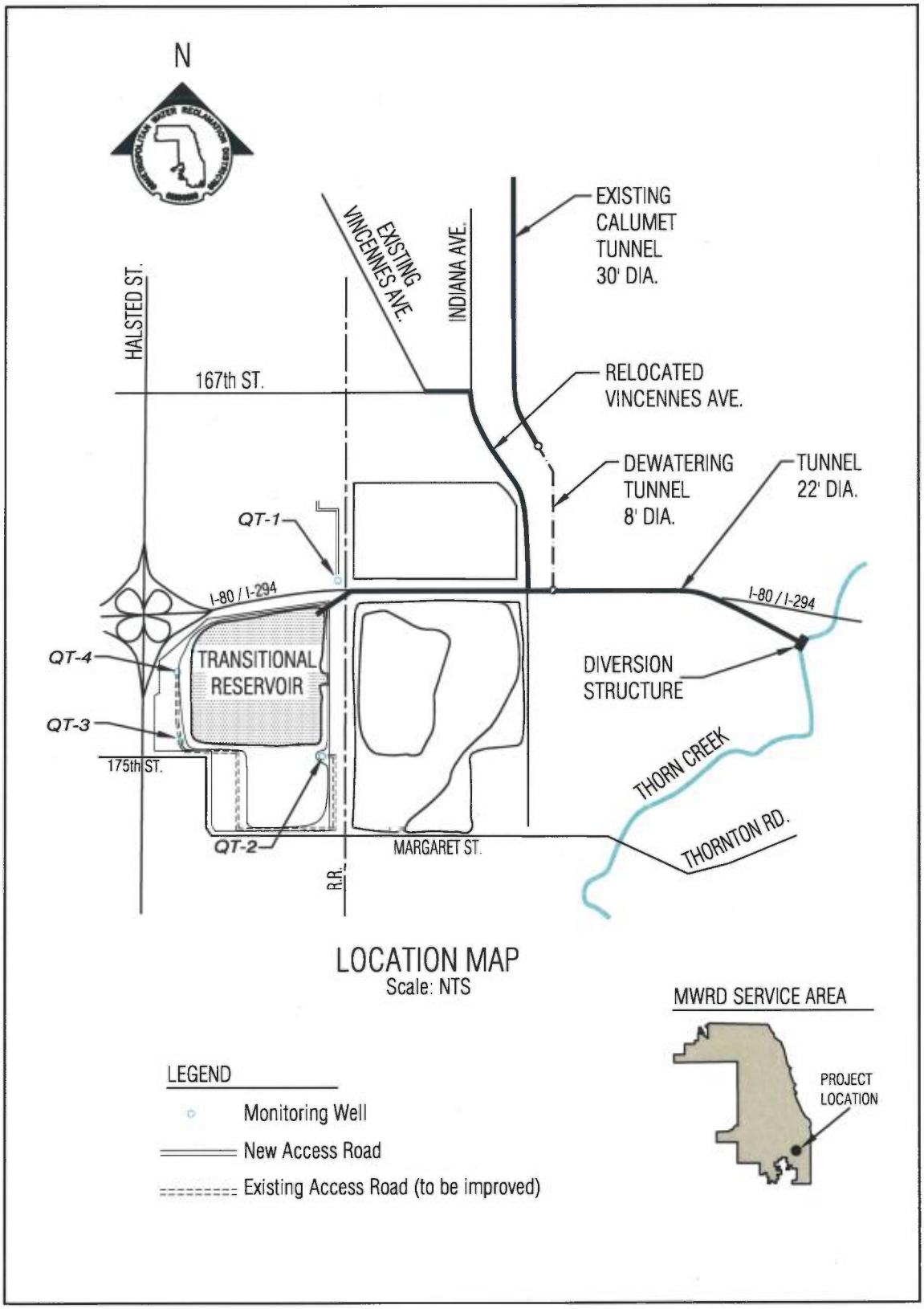
The Reservoir consists of a diversion structure at Thorn Creek, a 24-foot diameter dropshaft, and a 22-foot diameter conveyance tunnel to the Lower West Lobe of Thornton Quarry. The project also includes an 8-foot diameter tunnel connected to the Calumet Tunnel and Reservoir Plan System that is utilized for Reservoir dewatering purposes only.

The analytes measured in these samples include:

1. pH, electrical conductivity (EC), total dissolved solids (TDS), BOD_5, CN^-, F^-, Cl^-, SO_4^{2-}, NH_3-N, and phenol. Trace metals: Ag, As, B, Ba, Cd, Cr, Cu, Fe, Hg, Mn, Ni, and Pb.

2. Other parameters: fecal coliform (FC), groundwater temperature, and water elevation.

FIGURE 1: THORNTON TRANSITIONAL RESERVOIR
MONITORING WELL LOCATIONS



There was one significant rain event in 2018 which resulted in the diversion of Thorn Creek water to the TTR, with an accumulation of 2,504 MG in the TTR (Table 1). Since the Thornton Composite Reservoir (TCR) was placed in service in October 2015, water accumulation in the TTR is generally used for flushing the TCR for odor control. As a result, water was impounded in the TTR between February and December 2018. This triggered 44 sampling events for all TTR wells and the reservoir. For 11 events, sampling could not be conducted for the wells due to a personnel shortage because the highest priority of personnel allocation was placed on the Tunnel and Reservoir Plan fill-event sampling.

Summary of Data for Monitoring Wells and Reservoir

Analytical data for all sampling events are presented in Tables 2 through 6 for wells QT-1, -2, -3, -4, and the TTR, respectively.

The parameters in the wells that exceeded the upper 95 percent confidence limits established from the background samples of respective wells are presented in Table 7. Manganese, exceeded the established limit in all four wells. Silver exceeded the limit in three wells, and total dissolved solids, cyanide, and chloride exceeded the limits in two wells. The pH, sulfate, arsenic, barium, chromium, iron, and nickel exceeded the limits in one well only. In nearly all cases where exceedances were observed in 2018 for any parameter in a well, the corresponding concentration of that parameter in the reservoir was much lower than that in the well, indicating that the reservoir is most likely not the source of contamination causing the observed exceedances.

TABLE 1: DIVERSION TO THE THORNTON TRANSITIONAL FLOOD CONTROL RESERVOIR DURING 2018

Date of Diversion	Volume Collected in Thornton Transitional Reservoir	Rainfall (measured at Calumet WRP)	Date Reservoir Completely Drained	Number of Weeks Sampled
	Million Gallons	Inches		
02/18/18	2,504	2.72	NA[1]	44
Total	2,504	2.72		

[1]Not available; reservoir contained water February through December 2018.

TABLE 2: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-1 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		mS/m		mg/L										
Upper 95% Confidence Limit	7.6	NL[3]	2,408	NL	0.002	0.59	589	508	NL	NL	0	0.001	NL	0.095
02/28/18	6.9	184	2,284	<2	<0.005	0.36	909	328	0.42	<0.005	<0.001	<0.020	0.32	0.066
03/08/18	7.4	345	2,272	<2	<0.005	0.34	919	308	0.41	0.006	<0.001	<0.020	0.22	0.075
03/15/18	6.3	351	1,780	<2	<0.005	0.33	NRR[5]	330	0.34	<0.005	<0.001	<0.020	0.20	0.065
03/22/18	7.1	389	2,218	ND[4]	<0.005	0.34	472	323	0.40	0.005	<0.001	<0.020	0.19	0.064
03/29/18	6.9	219	2,194	<2	<0.005	0.37	183	327	0.37	<0.005	<0.001	<0.020	0.19	0.062
04/05/18	6.9	382	2,280	<2	<0.005	0.34	857	328	0.33	0.006	0.005	<0.050	0.24	0.083
04/27/18	7.0	379	2,338	<2	<0.005	0.35	367	334	0.38	<0.005	0.005	<0.050	0.24	0.084
05/03/18	7.5	251	2,334	<2	<0.005	0.34	906	331	0.37	0.006	0.005	<0.050	0.24	0.083
05/10/18	7.0	383	2,348	ND	<0.005	0.37	909	317	0.34	<0.005	0.005	<0.050	0.24	0.084
05/16/18	7.1	379	2,360	<2	<0.005	0.40	902	NRR	0.32	0.010	<0.005	<0.050	0.26	0.077
05/24/18	7.0	189	2,308	<2	<0.005	0.34	911	333	0.29	0.017	<0.005	<0.050	0.23	0.085
05/31/18	7.6	365	2,372	<2	<0.005	0.34	912	337	0.35	0.008	<0.005	<0.050	0.21	0.082
06/07/18	7.0	233	2,398	<2	<0.005	0.43	903	342	0.41	0.007	<0.005	<0.050	0.22	0.083
06/14/18	6.9	368	2,552	<2	<0.005	0.37	895	315	0.35	0.009	<0.005	<0.050	0.21	0.082
06/28/18	7.1	243	2,370	<2	<0.005	0.30	906	299	0.37	0.006	<0.005	<0.050	0.26	0.074
07/05/18	6.9	232	2,294	<2	<0.005	0.34	455	319	<0.50	<0.005	<0.003	<0.001	0.20	0.078
07/12/18	6.7	238	2,010	<2	<0.005	0.36	902	314	<0.50	0.011	<0.003	<0.001	0.21	0.067
07/18/18	7.1	368	2,304	<2	<0.005	0.32	904	302	<0.50	0.006	<0.003	<0.001	0.25	0.072
07/26/18	7.2	377	2,474	<2	<0.005	0.37	920	319	0.51	0.010	<0.003	<0.001	0.23	0.077
08/02/18	7.0	238	2,458	<2	<0.005	0.35	913	312	<0.50	0.007	<0.003	<0.001	0.22	0.077
08/09/18	6.9	371	2,398	<2	<0.005	0.35	908	310	<0.50	0.007	<0.003	<0.001	0.22	0.079
08/16/18	7.1	351	2,390	<2	<0.005	0.36	916	316	<0.50	0.005	<0.003	<0.001	0.21	0.077
08/23/18	6.7	378	2,514	<2	<0.005	0.37	918	328	<0.50	<0.005	<0.003	<0.001	0.20	0.079
09/13/18	6.7	243	2,326	<2	<0.005	0.32	920	231	<0.50	<0.005	<0.003	<0.001	0.23	0.085
09/20/18	6.8	335	902	<2	<0.005	0.39	924	297	<0.50	<0.005	<0.003	<0.001	0.24	0.081
09/27/18	6.9	257	2,306	<2	<0.005	0.35	910	280	<0.50	<0.005	<0.003	<0.001	0.25	0.082
10/04/18	6.9	368	2,270	<2	<0.005	0.29	907	203	<0.50	<0.005	<0.003	<0.001	0.25	0.057
10/11/18	7.3	384	2,276	ND	0.010	0.35	925	297	<0.50	<0.005	<0.003	<0.001	0.23	0.072

TABLE 2 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-1 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		mS/M	mg/L											
10/18/18	7.4	393	2,290	ND	0.012	0.36	926	297	<0.50	<0.005	<0.003	<0.001	0.22	0.081
10/25/18	7.0	394	2,380	<2	<0.005	0.36	934	318	<0.50	<0.005	<0.003	<0.001	0.22	0.078
11/01/18	7.4	391	2,338	ND	<0.005	0.42	NRR	301	<0.50	0.014	<0.003	<0.001	0.23	0.090
11/08/18	7.3	404	2,326	ND	<0.005	0.40	NRR	300	<0.50	0.010	<0.003	<0.001	0.22	0.077
11/15/18	7.4	395	2,386	<2	<0.005	0.32	915	304	<0.50	0.007	<0.003	<0.001	0.23	0.081

TABLE 2 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-1 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 mL	°C	ft	hr
Upper 95% Confidence Limit	0.002	0.005	0.022	49	0.00005	0.094	0.005	0.019	NL	NL	NL	NL
02/28/18	<0.001	<0.003	<0.004	10	<0.00005	0.083	<0.005	<0.010	<1	12.4	-183	<48
03/08/18	<0.001	<0.003	<0.004	13	<0.00005	0.090	<0.005	<0.010	<1	12.3	-183	<48
03/15/18	<0.001	<0.003	<0.004	12	<0.00005	0.079	<0.005	<0.010	<1	11.8	-188	<48
03/22/18	<0.001	<0.003	0.022	13	<0.00005	0.126	<0.005	<0.010	<1	12.3	-183	<48
03/29/18	<0.001	<0.003	0.004	15	<0.00005	0.098	<0.005	<0.010	<1	12.6	-185	<48
04/05/18	<0.005	<0.005	0.011	16	<0.00005	0.135	0.006	<0.020	<1	11.5	-180	<48
04/27/18	<0.005	<0.005	0.008	15	<0.00005	0.115	0.007	<0.020	<1	12.3	-183	<48
05/03/18	<0.005	<0.005	<0.025	17	<0.00005	0.096	<0.005	<0.030	<1	13.1	-152	<48
05/10/18	<0.005	<0.005	<0.025	14	<0.00005	0.068	<0.005	<0.030	<1	14.1	-153	<48
05/16/18	<0.005	<0.005	<0.025	7	<0.00005	0.105	<0.005	<0.030	<1	14.1	-183	<48
05/24/18	<0.005	<0.005	<0.025	10	<0.00005	0.050	<0.005	<0.030	<1	15.1	-183	<48
05/31/18	<0.005	<0.005	<0.025	10	<0.00005	0.058	<0.005	<0.030	1	13.4	-183	<48
06/07/18	<0.005	<0.005	<0.025	13	<0.00005	0.071	<0.005	<0.030	<1	13.2	-185	<48
06/14/18	<0.005	<0.005	<0.025	12	<0.00005	0.109	<0.005	<0.030	<1	12.9	-183	<48
06/28/18	<0.005	<0.005	<0.025	10	<0.00005	0.189	<0.005	<0.030	<1	13.7	-158	<48
07/05/18	<0.001	<0.002	0.014	13	<0.00005	0.111	0.001	<0.001	<1	14.3	-162	<48
07/12/18	<0.001	<0.002	0.008	14	<0.00005	0.228	<0.001	<0.001	<1	13.6	-153	<48
07/18/18	<0.001	<0.002	0.020	12	<0.00005	0.264	0.002	<0.001	<1	12.7	-156	<48
07/26/18	<0.001	<0.002	0.008	12	<0.00005	0.085	<0.001	<0.001	<1	13.9	-155	<48
08/02/18	<0.001	<0.002	0.012	14	<0.00005	0.135	0.001	<0.001	<1	13.5	-153	<48
08/09/18	<0.001	<0.002	0.010	12	<0.00005	0.137	<0.001	<0.001	<1	15.1	-153	<48
08/16/18	<0.001	<0.002	0.008	16	<0.00005	0.149	<0.001	<0.001	<1	14.1	-152	<48
08/23/18	<0.001	<0.002	0.004	12	<0.00005	0.071	<0.001	<0.001	<1	14.2	-153	<48
09/13/18	<0.001	<0.002	<0.001	10	<0.00005	0.058	<0.001	<0.001	<1	14.4	-151	<48
09/20/18	<0.001	<0.002	0.002	17	<0.00005	0.134	<0.001	<0.001	<1	14.8	-151	<48
09/27/18	<0.001	<0.002	0.003	16	<0.00005	0.113	<0.001	<0.001	<1	13.6	-153	<48
10/04/18	<0.001	<0.002	0.005	16	<0.00005	0.467	<0.001	<0.001	<1	13.4	-155	<48

TABLE 2 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-1 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 mL	°C	Ft	hr
10/11/18	<0.001	<0.002	<0.001	14	<0.00005	0.064	<0.001	<0.001	1	13.2	-153	<48
10/18/18	<0.001	<0.002	0.001	13	<0.00005	0.066	<0.001	<0.001	<1	12.3	-153	<48
10/25/18	<0.001	<0.002	<0.001	NRR	<0.00005	0.067	<0.001	<0.001	<1	12.4	-158	<48
11/01/18	<0.001	<0.002	0.002	12	<0.00005	0.073	<0.001	<0.001	<1	12.8	-151	<48
11/08/18	<0.001	<0.002	0.003	13	<0.00005	0.152	<0.001	<0.001	<1	12.4	-160	<48
11/15/18	<0.001	<0.002	0.011	14	<0.00005	0.088	<0.001	<0.001	<1	13.1	-160	<48

[1]Samples retrieved from QT-1 following a reservoir fill and weekly as well as prolonged storage of water in reservoir (for operational procedures). Trace metals have different reporting limits as they were analyzed at different District laboratories.

[2]EC=electrical conductivity; TDS=total dissolved solids.

[3]NL: No limit.

[4]ND: Not analyzed due to insufficient samples.

[5]NRR: No reportable result due to QA/QC failure during laboratory analysis.

[6] Reporting limits changed to 0.5 mg/L in July 2018 due to the change in test equipment.

[7]Relative to Chicago City Datum (579.48 ft above mean sea level) at intersection of Madison and State Streets.

TABLE 3: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-2 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		mS/m	----------					mg/L						
Upper 95% Confidence Limit	7.5	NL[3]	2,651	NL	0.002	0.38	478	757	NL	NL	0.0001	0.006	NL	0.069
02/28/18	7.0	164	1,206	<2	<0.005	0.25	214	457	0.44	<0.005	<0.001	0.041	0.27	0.043
03/08/18	7.3	184	1,028	<2	<0.005	0.26	258	435	0.37	<0.005	<0.001	0.031	0.23	0.041
03/15/18	6.6	179	1,210	<2	<0.005	0.28	100	478	0.31	<0.005	<0.001	0.033	0.23	0.039
03/22/18	7.2	186	1,166	ND[4]	<0.005	0.27	206	482	0.41	<0.005	<0.001	0.026	0.23	0.038
03/29/18	7.1	123	1,446	<2	<0.005	0.25	182	612	0.29	<0.005	<0.001	<0.020	0.22	0.036
04/05/18	6.2	188	1,318	<2	<0.005	0.24	189	562	0.28	0.005	0.005	<0.050	0.22	0.044
04/27/18	7.2	184	1,308	<2	<0.005	0.25	196	519	0.34	<0.005	0.004	<0.050	0.23	0.045
05/03/18	7.2	173	1,256	<2	<0.005	0.25	196	519	0.31	<0.005	<0.005	<0.050	0.21	0.045
05/10/18	7.3	187	1,292	ND	<0.005	0.28	204	491	0.31	<0.005	<0.005	<0.050	0.22	0.047
05/16/18	7.1	173	1,310	<2	<0.005	0.30	205	NRR[5]	0.33	0.007	<0.005	<0.050	0.24	0.044
05/24/18	7.2	150	1,262	4	<0.005	0.26	203	507	0.32	0.009	<0.005	<0.050	0.23	0.044
05/31/18	7.4	176	1,266	<2	<0.005	0.24	204	478	0.37	<0.005	<0.005	0.051	0.20	0.044
06/14/18	7.2	178	1,600	<2	<0.005	0.27	205	477	0.33	0.006	<0.005	<0.050	0.20	0.043
06/21/18	7.1	176	1,290	<2	<0.005	0.26	203	217	0.35	<0.005	<0.005	<0.050	0.24	0.047
06/28/18	7.6	118	1,352	<2	<0.005	0.26	210	486	0.36	0.005	<0.005	<0.050	0.22	0.047
07/05/18	7.1	118	1,294	<2	<0.005	0.26	204	503	<0.50	<0.005	<0.003	0.039	0.22	0.042
07/12/18	6.5	118	1,370	<2	<0.005	0.27	188	536	<0.50	0.007	<0.003	0.031	0.20	0.040
07/18/18	7.1	189	1,302	<2	<0.005	0.28	193	537	<0.50	<0.005	<0.003	0.033	0.21	0.041
07/26/18	7.2	195	1,396	<2	<0.005	0.27	204	499	<0.50	0.005	<0.003	0.040	0.23	0.041
08/02/18	7.0	118	814	<2	<0.005	0.25	200	476	<0.50	<0.005	<0.003	0.039	0.22	0.042
08/09/18	6.9	176	1,346	<2	<0.005	0.27	193	489	<0.50	<0.005	<0.003	0.039	0.22	0.041
08/16/18	7.3	177	1,308	<2	<0.005	0.27	204	495	<0.50	0.003	<0.003	0.039	0.23	0.040
08/23/18	7.0	180	1,408	<2	<0.005	0.28	202	496	<0.50	<0.005	<0.003	0.038	0.21	0.041
09/13/18	7.0	110	1,254	<2	<0.005	0.23	196	519	<0.50	<0.005	<0.003	0.040	0.22	0.042
09/20/18	6.9	171	920	<2	<0.005	0.30	202	510	<0.50	<0.005	<0.003	0.041	0.23	0.041
09/27/18	7.2	120	1,254	<2	<0.005	0.26	203	482	<0.50	<0.005	<0.003	0.037	0.21	0.041
10/04/18	6.6	155	1,228	<2	<0.005	0.26	207	454	<0.50	<0.005	<0.003	0.039	0.22	0.037

TABLE 3 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-2 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		mS/m	mg/L											
10/11/18	7.4	184	1,182	ND	<0.005	0.27	191	485	0.56	<0.005	<0.003	0.039	0.20	0.036
10/18/18	7.4	180	1,170	ND	<0.005	0.27	198	452	<0.50	<0.005	<0.003	0.042	0.23	0.042
10/25/18	6.7	176	1,220	<2	<0.005	0.27	202	490	<0.50	<0.005	<0.003	0.044	0.23	0.040
11/01/18	7.3	179	1,182	ND	<0.005	NRR	208	459	<0.50	<0.005	<0.003	0.045	0.22	0.044
11/08/18	7.2	181	1,172	ND	<0.005	NRR	210	459	<0.50	0.005	<0.003	0.047	0.22	0.040
11/15/18	7.5	183	1,182	<2	0.006	0.26	214	461	0.93	<0.005	<0.003	0.043	0.23	0.039
11/21/18	6.5	141	1,156	<2	<0.005	0.26	209	454	<0.50	<0.005	<0.003	0.046	0.23	0.040
11/29/18	6.6	138	1,208	<2	0.005	0.30	221	449	<0.50	<0.005	<0.003	0.046	0.21	0.039
12/06/18	7.3	135	1,198	<2	<0.005	0.32	217	435	<0.50	<0.005	<0.003	0.046	0.21	0.043
12/12/18	7.7	137	1,168	<2	<0.005	0.28	207	NRR	<0.50	<0.005	<0.003	0.049	0.22	0.044
12/20/18	7.6	139	1,162	ND	<0.005	0.28	211	450	<0.50	<0.005	<0.003	0.046	0.22	0.041
12/26/18	7.6	139	1,198	<2	<0.005	0.30	214	454	<0.50	0.005	<0.003	0.050	0.22	0.042

TABLE 3 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-2 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 ml	°C	ft	hr
Upper 95% Confidence Limit	0.002	0.007	0.033	5	0.0003	0.063	NL	0.019	NL	NL	NL	NL
02/28/18	<0.001	<0.003	<0.004	3	<0.00005	0.077	0.005	<0.010	<1	14.9	-158	<48
03/08/18	<0.001	<0.003	<0.004	3	<0.00005	0.091	<0.005	<0.010	<1	14.0	-159	<48
03/15/18	<0.001	<0.003	<0.004	2	<0.00005	0.041	<0.005	<0.010	<1	12.7	-165	<48
03/22/18	<0.001	<0.003	<0.004	3	<0.00005	0.061	<0.005	<0.010	<1	13.8	-159	<48
03/29/18	<0.001	<0.003	<0.004	3	<0.00005	0.048	0.005	<0.010	<1	13.7	-187	<48
04/05/18	<0.005	<0.005	<0.005	4	<0.00005	0.063	0.012	<0.020	<1	14.2	-189	<48
04/27/18	<0.005	<0.005	<0.005	3	<0.00005	0.041	0.011	<0.020	<1	14.7	-192	<48
05/03/18	<0.005	<0.005	<0.025	2	<0.00005	0.036	0.009	<0.030	<1	15.0	-193	<48
05/10/18	<0.005	<0.005	<0.025	2	<0.00005	0.025	0.008	<0.030	<1	15.0	-194	<48
05/16/18	<0.005	<0.005	<0.025	2	<0.00005	0.027	0.008	<0.030	<1	16.0	-192	<48
05/24/18	<0.005	<0.005	<0.025	2	<0.00005	0.029	0.010	<0.030	<1	15.3	-192	<48
05/31/18	<0.005	<0.005	<0.025	2	<0.00005	0.028	0.006	<0.030	<1	15.3	-192	<48
06/14/18	<0.005	<0.005	<0.025	2	<0.00005	0.027	0.008	<0.030	<1	15.1	-192	<48
06/21/18	<0.005	<0.005	<0.025	2	<0.00005	0.026	0.009	<0.030	<1	15.8	-189	<48
06/28/18	<0.005	<0.005	<0.025	3	<0.00005	0.040	0.007	<0.030	<1	14.9	-180	<48
07/05/18	<0.001	<0.002	0.003	4	<0.00005	0.052	0.005	0.001	<1	16.5	-190	<48
07/12/18	<0.001	<0.002	0.002	4	<0.00005	0.060	0.006	<0.001	<1	16.5	-192	<48
07/18/18	<0.001	<0.002	0.005	4	<0.00005	0.047	0.006	<0.001	<1	15.2	-195	<48
07/26/18	<0.001	0.002	0.003	2	<0.00005	0.031	0.005	<0.001	<1	14.1	-191	<48
08/02/18	<0.001	<0.002	0.002	2	<0.00005	0.029	0.005	<0.001	<1	16.5	-193	<48
08/09/18	<0.001	<0.002	0.001	3	<0.00005	0.029	0.004	<0.001	<1	15.9	-192	<48
08/16/18	<0.001	<0.002	0.002	3	<0.00005	0.032	0.004	<0.001	<1	15.5	-192	<48
08/23/18	<0.001	<0.002	<0.001	3	<0.00005	0.032	0.004	<0.001	<1	15.7	-191	<48
09/13/18	<0.001	<0.002	<0.001	3	<0.00005	0.034	0.004	<0.001	1	16.9	-193	<48
09/20/18	<0.001	<0.002	<0.001	3	<0.00005	0.030	0.004	<0.001	<1	16.0	-192	<48
09/27/18	<0.001	<0.002	<0.001	4	<0.00005	0.049	0.003	<0.001	<1	14.0	-191	<48
10/04/18	<0.001	<0.002	0.001	3	<0.00005	0.033	0.005	<0.001	<1	14.6	-192	<48

TABLE 3 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-2 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 ml	°C	ft	hr
10/11/18	<0.001	<0.002	<0.001	3	<0.00005	0.030	0.004	<0.001	<1	14.3	-192	<48
10/18/18	<0.001	<0.002	0.001	3	<0.00005	0.036	0.005	<0.001	1	14.2	-192	<48
10/25/18	<0.001	<0.002	<0.001	NRR	<0.00005	0.039	0.004	<0.001	<1	14.7	-192	<48
11/01/18	<0.001	<0.002	<0.001	3	<0.00005	0.035	0.004	<0.001	<1	13.9	-194	<48
11/08/18	<0.001	<0.002	<0.001	3	<0.00005	0.027	0.004	<0.001	<1	13.6	-186	<48
11/15/18	<0.001	<0.002	0.003	3	<0.00005	0.039	0.004	<0.001	<1	13.4	-192	<48
11/21/18	<0.001	<0.002	0.002	3	<0.00005	0.034	0.004	<0.001	<1	13.7	-193	<48
11/29/18	<0.001	<0.002	0.014	3	<0.00005	0.037	0.004	0.001	<1	13.1	-192	<48
12/06/18	<0.001	<0.002	0.001	4	<0.00005	0.040	0.004	<0.001	<1	13.2	-193	<48
12/12/18	<0.001	<0.002	0.001	3	<0.00005	0.032	0.004	<0.001	<1	14.1	-193	<48
12/20/18	<0.001	<0.002	0.003	3	<0.00005	0.042	0.004	<0.001	<1	14.3	-186	<48
12/26/18	<0.001	<0.002	0.007	3	NRR	0.029	0.004	<0.001	<1	14.2	-193	<48

[1]Samples retrieved from QT-2 following a reservoir fill and weekly as well as prolonged storage of water in reservoir (for operational procedures). Trace metals have different reporting limits as they were analyzed at different District laboratories.
[2]EC=electrical conductivity; TDS=total dissolved solids.
[3]NL: No limit.
[4]ND: Not analyzed due to insufficient samples.
[5]NRR: No reportable result due to QA/QC failure during laboratory analysis.
[6] Reporting limits changed to 0.5 mg/L in July 2018 due to the change in test equipment.
[7]Relative to Chicago City Datum (579.48 ft above mean sea level) at intersection of Madison and State Streets.

TABLE 4: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-3 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		mS/m	mg/L											
Upper 95% Confidence Limit	7.8	NL[3]	1,353	NL	0.002	0.36	190	238	NL	NL	0.0292	0	NL	0.082
02/28/18	6.7	179	1,334	<2	<0.005	0.19	392	225	0.37	<0.005	<0.0010	<0.020	0.24	0.082
03/08/18	7.1	214	1,352	<2	<0.005	0.19	207	223	0.35	0.007	<0.0010	<0.020	0.20	0.088
03/15/18	6.9	226	1,360	<2	<0.005	0.22	381	224	0.29	0.006	<0.0010	<0.020	0.21	0.076
03/22/18	7.0	227	1,304	ND[4]	<0.005	0.21	375	222	0.37	0.005	<0.0010	<0.020	0.14	0.075
03/29/18	6.9	135	1,252	<2	<0.005	0.22	380	209	0.30	<0.005	<0.0010	<0.020	0.20	0.072
04/05/18	7.1	216	1,286	<2	<0.005	0.20	355	203	0.26	<0.005	0.0050	<0.050	0.26	0.089
04/27/18	7.2	212	1,226	<2	<0.005	0.23	333	173	0.25	<0.005	0.0040	<0.050	0.29	0.074
05/03/18	7.1	201	1,410	<2	<0.005	0.22	381	219	0.31	0.010	0.0060	<0.050	0.26	0.094
05/10/18	7.1	231	1,434	ND	<0.005	0.25	398	212	0.27	<0.005	0.0050	<0.050	0.24	0.090
05/16/18	6.9	207	1,340	<2	<0.005	0.28	399	NRR[5]	0.25	0.011	<0.0050	<0.050	0.27	0.086
05/24/18	7.0	170	1,374	<2	<0.005	0.18	428	248	0.26	0.021	<0.0050	<0.050	0.25	0.093
05/31/18	7.0	226	1,480	<2	<0.005	0.17	410	226	0.35	0.009	<0.0050	<0.050	0.23	0.091
06/14/18	7.0	224	1,706	<2	<0.005	0.22	419	233	0.30	0.012	<0.0050	<0.050	0.22	0.095
06/21/18	7.0	221	1,444	ND	<0.005	0.48	402	124	0.30	0.011	<0.0050	<0.050	0.23	0.095
06/28/18	7.2	141	1,614	<2	<0.005	0.19	436	247	0.32	0.007	0.0050	<0.050	0.21	0.105
07/05/18	6.9	151	1,530	<2	<0.005	0.17	437	247	<0.50	<0.005	<0.0030	<0.001	0.18	0.094
07/12/18	6.1	151	1,544	<2	<0.005	0.22	437	242	<0.50	0.014	<0.0030	<0.001	0.20	0.093
07/18/18	6.8	227	1,446	<2	<0.005	0.21	410	225	<0.50	0.008	<0.0030	<0.001	0.21	0.096
07/26/18	7.0	230	1,498	<2	<0.005	0.21	425	227	<0.50	0.006	<0.0030	<0.001	0.21	0.092
08/02/18	6.9	150	1,490	<2	<0.005	0.19	426	235	<0.50	0.009	<0.0030	<0.001	0.21	0.092
08/09/18	6.8	216	1,552	<2	<0.005	0.21	418	244	<0.50	0.008	<0.0030	<0.001	0.21	0.089
08/16/18	7.1	221	1,462	<2	<0.005	0.20	403	250	<0.50	0.005	<0.0030	<0.001	0.21	0.091
08/23/18	6.9	210	1,642	<2	<0.005	0.21	437	238	<0.50	<0.005	<0.0030	<0.001	0.20	0.087
09/13/18	6.6	125	1,402	<2	<0.005	0.18	402	156	<0.50	<0.005	<0.0030	<0.001	0.22	0.098
09/20/18	6.7	232	1,274	<2	<0.005	0.26	396	209	<0.50	<0.005	<0.0030	<0.001	0.25	0.091
09/27/18	6.9	143	1,448	<2	<0.005	0.20	439	216	<0.50	<0.005	<0.0030	<0.001	0.22	0.098
10/04/18	7.1	229	1,496	<2	<0.005	0.20	406	213	<0.50	<0.005	<0.0030	<0.001	0.23	0.075

TABLE 4 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-3 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		mS/M	mg/L											
10/11/18	7.1	234	1,434	ND	<0.005	0.21	405	222	<0.50	<0.005	<0.0030	<0.001	0.24	0.082
10/18/18	7.1	231	1,420	ND	<0.005	0.22	410	219	<0.50	<0.005	<0.0030	<0.001	0.21	0.092
10/25/18	6.8	228	1,480	<2	<0.005	0.21	432	244	<0.50	<0.005	<0.0030	<0.001	0.22	0.092
11/01/18	7.0	223	1,424	ND	<0.005	0.26	NRR	218	<0.50	0.014	<0.0030	<0.001	0.23	0.098
11/08/18	6.9	230	1,346	ND	<0.005	0.25	NRR	218	<0.50	0.011	<0.0030	<0.001	0.22	0.089
11/15/18	7.3	226	1,436	<2	<0.005	0.20	423	224	<0.50	0.008	<0.0030	<0.001	0.20	0.095
11/21/18	6.6	170	1,380	<2	<0.005	0.20	416	220	<0.50	0.007	<0.0030	<0.001	0.23	0.087
11/29/18	6.2	171	1,390	<2	<0.005	0.23	433	233	<0.50	0.007	<0.0030	<0.001	0.20	0.093
12/06/18	7.1	169	1,354	<2	<0.005	0.21	394	203	<0.50	<0.005	<0.0030	<0.001	0.21	0.097
12/12/18	7.0	169	1,430	<2	<0.005	0.21	419	219	<0.50	<0.005	<0.0030	<0.001	0.21	0.098
12/20/18	7.2	172	1,452	ND	<0.005	0.21	421	231	<0.50	0.006	<0.0030	<0.001	0.23	0.105
12/26/18	7.0	183	1,508	<2	<0.005	0.23	416	229	<0.50	0.009	<0.0030	<0.001	0.21	0.100

TABLE 4 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-3 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 ml	°C	ft	hr
Upper 95% Confidence Level	0.001	0.006	0.022	21	0.00005	0.158	NL	0.014	NL	NL	NL	NL
02/28/18	<0.001	<0.003	<0.004	7	<0.00005	0.087	<0.005	<0.010	<1	12.3	-157	<48
03/08/18	<0.001	<0.003	<0.004	10	<0.00005	0.115	<0.005	<0.010	<1	11.6	-153	<48
03/15/18	<0.001	<0.003	<0.004	8	<0.00005	0.126	<0.005	<0.010	<1	11.7	-173	<48
03/22/18	<0.001	<0.003	0.005	20	<0.00005	0.293	<0.005	<0.010	<1	11.8	-153	<48
03/29/18	<0.001	<0.003	<0.004	11	<0.00005	0.128	<0.005	<0.010	<1	11.7	-176	<48
04/05/18	<0.005	<0.005	<0.005	22	<0.00005	0.286	0.006	<0.020	<1	12.2	-181	<48
04/27/18	<0.005	<0.005	<0.005	18	<0.00005	0.536	0.007	<0.020	<1	12.1	-185	<48
05/03/18	<0.005	<0.005	<0.025	6	<0.00005	0.095	<0.005	<0.030	<1	12.9	-185	<48
05/10/18	<0.005	<0.005	<0.025	15	<0.00005	0.189	<0.005	<0.030	<1	12.8	-185	<48
05/16/18	<0.005	<0.005	<0.025	22	<0.00005	0.328	0.005	<0.030	<1	14.2	-184	<48
05/24/18	<0.005	<0.005	<0.025	8	<0.00005	0.120	0.006	<0.030	<1	13.2	-184	<48
05/31/18	<0.005	<0.005	<0.025	13	<0.00005	0.167	0.006	<0.030	<1	12.9	-183	<48
06/14/18	<0.005	<0.005	<0.025	14	<0.00005	0.173	0.010	<0.030	<1	13.2	-182	<48
06/21/18	<0.005	<0.005	<0.025	25	<0.00005	0.381	<0.005	<0.030	<1	12.7	-180	<48
06/28/18	<0.005	<0.005	<0.025	17	<0.00005	0.205	0.005	<0.030	<1	13.8	-176	<48
07/05/18	<0.001	<0.002	0.007	15	<0.00005	0.186	0.002	<0.001	<1	14.6	-190	<48
07/12/18	<0.001	<0.002	0.005	14	<0.00005	0.191	0.002	<0.001	<1	14.8	-185	<48
07/18/18	<0.001	<0.002	0.013	25	<0.00005	0.412	0.002	<0.001	<1	14.3	-194	<48
07/26/18	<0.001	<0.002	0.005	4	<0.00005	0.077	0.001	<0.001	<1	13.3	-197	<48
08/02/18	<0.001	<0.002	0.006	14	<0.00005	0.167	<0.001	<0.001	<1	14.5	-185	<48
08/09/18	<0.001	<0.002	0.004	15	<0.00005	0.168	<0.001	<0.001	<1	14.7	-192	<48
08/16/18	<0.001	<0.002	0.005	22	<0.00005	0.314	<0.001	<0.001	<1	13.2	-194	<48
08/23/18	<0.001	<0.002	0.002	13	<0.00005	0.158	<0.001	<0.001	<1	14.4	-180	<48
09/13/18	<0.001	<0.002	<0.001	3	<0.00005	0.093	<0.001	<0.001	<1	12.9	-183	<48
09/20/18	<0.001	<0.002	<0.001	9	<0.00005	0.124	<0.001	<0.001	<1	12.9	-184	<48
09/27/18	<0.001	<0.002	0.002	15	<0.00005	0.195	<0.001	<0.001	<1	12.7	-180	<48
10/04/18	<0.001	<0.002	0.005	12	<0.00005	0.187	0.005	0.001	<1	12.5	-181	<48

TABLE 4 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-3 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 ml	°C	ft	hr
10/11/18	<0.001	<0.002	0.001	16	<0.00005	0.179	0.001	<0.001	<1	12.4	-181	<48
10/18/18	<0.001	<0.002	0.013	15	<0.00005	0.160	0.074	0.002	<1	12.0	-183	<48
10/25/18	<0.001	<0.002	<0.001	NRR	<0.00005	0.146	<0.001	<0.001	<1	12.2	-181	<48
11/01/18	<0.001	<0.002	0.002	16	<0.00005	0.194	<0.001	<0.001	<1	12.3	-183	<48
11/08/18	<0.001	<0.002	0.002	16	<0.00005	0.182	<0.001	<0.001	<1	11.8	-182	<48
11/15/18	<0.001	<0.002	0.008	7	<0.00005	0.087	<0.001	<0.001	<1	11.2	-182	<48
11/21/18	<0.001	<0.002	0.004	16	<0.00005	0.179	<0.001	<0.001	<1	11.4	-182	<48
11/29/18	<0.001	<0.002	0.001	4	<0.00005	0.071	<0.001	<0.001	<1	13.1	-182	<48
12/06/18	<0.001	<0.002	0.002	19	<0.00005	0.188	0.001	<0.001	<1	11.3	-182	<48
12/12/18	<0.001	<0.002	0.002	17	<0.00005	0.195	<0.001	<0.001	<1	11.9	-181	<48
12/20/18	<0.001	0.021	0.002	18	<0.00005	0.197	0.001	<0.001	<1	11.9	-183	<48
12/26/18	<0.001	<0.002	0.003	16	NRR	0.185	<0.001	<0.001	<1	11.8	-181	<48

[1]Samples retrieved from QT-3 following a reservoir fill and weekly as well as prolonged storage of water in reservoir (for operational procedures). Trace metals have different reporting limits as they were analyzed at different District laboratories.
[2]EC=electrical conductivity; TDS=total dissolved solids.
[3]NL: No limit.
[4]ND: Not analyzed due to insufficient samples.
[5]NRR: No reportable result due to QA/QC failure during laboratory analysis.
[6] Reporting limits changed to 0.5 mg/L in July 2018 due to the change in test equipment.
[7]Relative to Chicago City Datum (579.48 ft above mean sea level) at intersection of Madison and State Streets.

TABLE 5: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-4 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		ms/M	mg/L											
Upper 95% Confidence Limit	7.7	NL[3]	2,034	NL	0.002	0.39	590	314	NL	NL	0.0033	NL	NL	0.181
02/28/18	6.7	223	1,168	<2	<0.005	0.21	275	241	0.37	<0.005	<0.0010	<0.020	0.38	0.073
03/08/18	7.3	188	1,078	<2	<0.005	0.23	258	234	0.39	0.008	<0.0010	<0.020	0.37	0.072
03/15/18	6.3	188	1,164	<2	<0.005	0.25	54	222	0.34	0.006	<0.0010	<0.020	0.38	0.065
03/22/18	7.1	191	1,164	ND[4]	<0.005	0.23	269	241	0.36	0.005	<0.0010	<0.020	0.35	0.067
03/29/18	6.9	115	1,162	<2	<0.005	0.26	249	236	0.36	<0.005	<0.0010	<0.020	0.37	0.062
04/05/18	7.1	184	1,124	<2	0.014	0.22	263	240	0.33	0.006	0.0040	<0.050	0.40	0.076
04/27/18	7.0	192	1,216	<2	<0.005	0.23	269	222	0.35	<0.005	0.0040	<0.050	0.38	0.075
05/03/18	7.1	190	1,190	<2	<0.005	0.25	281	242	0.37	0.008	<0.0050	<0.050	0.36	0.081
05/10/18	7.1	194	1,244	ND	<0.005	0.25	297	234	0.34	<0.005	<0.0050	<0.050	0.36	0.083
05/16/18	7.2	196	1,262	<2	<0.005	0.28	298	NRR[5]	0.34	0.005	<0.0050	<0.050	0.39	0.079
05/24/18	7.1	158	1,220	<2	<0.005	0.24	292	235	0.32	0.020	<0.0050	<0.050	0.37	0.080
05/31/18	7.1	194	1,260	<2	<0.005	0.21	299	234	0.40	0.009	<0.0050	<0.050	0.36	0.079
06/14/18	7.1	192	1,458	<2	<0.005	0.25	285	239	0.36	0.011	<0.0050	<0.050	0.35	0.078
07/05/18	7.3	122	1,206	<2	<0.005	0.21	270	235	<0.50	<0.005	<0.0030	<0.001	0.37	0.063
07/12/18	6.5	119	1,280	<2	<0.005	0.26	275	244	<0.50	0.012	<0.0030	<0.001	0.34	0.073
07/18/18	7.0	186	1,232	<2	<0.005	0.24	283	244	<0.50	0.006	<0.0030	<0.001	0.35	0.076
07/26/18	7.3	210	1,304	<2	<0.005	0.26	283	224	<0.50	0.009	<0.0030	<0.001	0.38	0.075
08/02/18	6.8	122	1,282	<2	<0.005	0.23	278	232	<0.50	0.006	<0.0030	<0.001	0.35	0.075
08/09/18	6.9	188	1,308	<2	0.005	0.24	275	248	<0.50	0.008	<0.0030	<0.001	0.35	0.076
08/16/18	7.3	187	1,216	<2	<0.005	0.24	289	241	<0.50	<0.005	<0.0030	<0.001	0.37	0.075
08/23/18	6.9	188	1,334	<2	<0.005	0.26	287	243	<0.50	<0.005	<0.0030	<0.001	0.33	0.073
09/13/18	6.9	86	1,206	<2	<0.005	0.20	281	158	<0.50	<0.005	<0.0030	<0.001	0.37	0.080
09/20/18	6.8	191	1,160	<2	<0.005	0.28	283	233	<0.50	<0.005	<0.0030	<0.001	0.37	0.079
09/27/18	7.2	133	1,232	<2	<0.005	0.24	299	239	<0.50	<0.005	<0.0030	<0.001	0.38	0.080
10/04/18	7.2	193	1,238	<2	<0.005	0.25	293	192	<0.50	<0.005	<0.0030	<0.001	0.37	0.066
10/11/18	7.2	195	1,162	ND	<0.005	0.25	272	233	<0.50	<0.005	<0.0030	<0.001	0.36	0.065
10/18/18	7.4	191	1,176	ND	<0.005	0.25	281	233	<0.50	<0.005	<0.0030	<0.001	0.36	0.076

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-4 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	pH	EC[2]	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
		ms/M	mg/L											
10/25/18	6.9	194	1,196	5	<0.005	0.25	282	235	<0.50	<0.005	<0.0030	<0.001	0.38	0.075
11/01/18	7.1	193	1,180	ND	<0.005	0.26	NRR	229	<0.50	0.009	<0.0030	<0.001	0.37	0.085
11/08/18	7.0	196	1,188	ND	<0.005	0.25	NRR	231	<0.50	0.009	<0.0030	<0.001	0.39	0.078
11/15/18	7.1	195	728	<2	<0.005	0.27	279	220	<0.50	0.007	<0.0030	<0.001	0.38	0.073
11/21/18	6.8	202	1,184	<2	<0.005	0.23	303	231	<0.50	0.008	<0.0030	<0.001	0.36	0.073
11/29/18	7.1	160	1,236	<2	<0.005	0.27	293	223	<0.50	<0.005	<0.0030	<0.001	0.35	0.073
12/06/18	7.1	157	1,210	<2	<0.005	0.25	284	217	<0.50	<0.005	<0.0030	<0.001	0.37	0.082
12/12/18	7.1	157	1,192	<2	<0.005	0.25	307	232	<0.50	<0.005	<0.0030	<0.001	0.35	0.083
12/20/18	7.1	155	1,180	ND	<0.005	0.26	284	224	<0.50	<0.005	<0.0030	<0.001	0.39	0.087
12/26/18	7.2	158	1,232	<2	<0.005	0.26	302	233	<0.50	0.005	<0.0030	<0.001	0.35	0.079

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-4 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 mL	°C	ft	hr
Upper 95% confidence Limit	0.001	0.022	0.035	24	0.00004	0.203	NL	0.018	NL	NL	NL	NL
02/28/18	<0.001	<0.003	<0.004	9	<0.00005	0.084	0.006	<0.010	<1	12.2	-92	<48
03/08/18	<0.001	<0.003	0.007	9	<0.00005	0.063	<0.005	<0.010	<1	13.1	-93	<48
03/15/18	<0.001	<0.003	<0.004	6	<0.00005	0.070	<0.005	<0.010	<1	13.3	-119	<48
03/22/18	<0.001	<0.003	<0.004	13	<0.00005	0.118	<0.005	<0.010	<1	13.2	-94	<48
03/29/18	<0.001	<0.003	<0.004	11	<0.00005	0.080	<0.005	<0.010	<1	12.9	-92	<48
04/05/18	<0.005	<0.005	<0.005	14	<0.00005	0.140	<0.005	<0.020	<1	12.9	-92	<48
04/27/18	<0.005	<0.005	<0.005	11	<0.00005	0.257	<0.005	<0.020	<1	12.8	-96	<48
05/03/18	<0.005	<0.005	<0.025	12	<0.00005	0.102	<0.005	<0.030	<1	13.2	-92	<48
05/10/18	<0.005	<0.005	<0.025	13	<0.00005	0.090	<0.005	<0.030	<1	14.3	-94	<48
05/16/18	<0.005	<0.005	<0.025	15	<0.00005	0.153	<0.005	<0.030	<1	14.2	-92	<48
05/24/18	<0.005	<0.005	<0.025	6	<0.00005	0.064	<0.005	<0.030	<1	13.5	-92	<48
05/31/18	<0.005	<0.005	<0.025	7	<0.00005	0.062	<0.005	<0.030	<1	13.8	-91	<48
06/14/18	<0.005	<0.005	<0.025	12	<0.00005	0.094	<0.005	<0.030	<1	13.4	-92	<48
07/05/18	<0.001	0.003	0.003	7	<0.00005	0.199	0.002	<0.001	<1	13.4	-97	<48
07/12/18	<0.001	0.002	0.002	11	<0.00005	0.096	<0.001	<0.001	<1	15.2	-95	<48
07/18/18	<0.001	<0.002	0.004	13	<0.00005	0.147	0.001	<0.001	<1	14.0	-103	<48
07/26/18	<0.001	<0.002	0.005	13	<0.00005	0.126	<0.001	<0.001	1	13.5	-108	<48
08/02/18	<0.001	<0.002	0.005	12	<0.00005	0.109	<0.001	<0.001	<1	15.0	-95	<48
08/09/18	<0.001	<0.002	0.001	11	<0.00005	0.091	<0.001	<0.001	<1	15.8	-92	<48
08/16/18	<0.001	<0.002	0.003	12	<0.00005	0.156	<0.001	<0.001	<1	14.8	-98	<48
08/23/18	<0.001	<0.002	<0.001	6	<0.00005	0.087	<0.001	<0.001	<1	14.8	-93	<48
09/13/18	<0.001	<0.002	<0.001	9	<0.00005	0.092	<0.001	<0.001	<1	14.7	-92	<48
09/20/18	<0.001	<0.002	0.001	10	<0.00005	0.080	<0.001	<0.001	<1	14.5	-96	<48
09/27/18	<0.001	<0.002	0.001	15	<0.00005	0.201	<0.001	<0.001	<1	13.9	-91	<48
10/04/18	<0.001	<0.002	0.011	13	<0.00005	0.193	0.014	<0.001	<1	13.1	-89	<48
10/11/18	<0.001	<0.002	<0.001	14	<0.00005	0.121	<0.001	<0.001	<1	14.9	-94	<48

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL QT-4 AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Water Elevation[7]	Recharge Time
	mg/L								CFU/100 mL	°C	ft	hr
10/18/18	<0.001	<0.002	<0.001	11	<0.00005	0.095	<0.001	<0.001	1	14.7	-93	<48
10/25/18	<0.001	<0.002	<0.001	NRR	<0.00005	0.110	<0.001	<0.001	<1	14.0	-94	<48
11/01/18	<0.001	<0.002	0.001	11	<0.00005	0.115	0.001	<0.001	<1	14.7	-94	<48
11/08/18	<0.001	<0.002	0.001	13	<0.00005	0.119	<0.001	<0.001	<1	14.7	-92	<48
11/15/18	<0.001	<0.002	0.005	11	<0.00005	0.097	<0.001	<0.001	<1	14.4	-92	<48
11/21/18	<0.001	<0.002	0.001	12	<0.00005	0.112	<0.001	<0.001	<1	13.8	-95	<48
11/29/18	<0.001	<0.002	0.003	12	<0.00005	0.116	<0.001	<0.001	<1	14.2	-93	<48
12/06/18	<0.001	<0.002	<0.001	12	<0.00005	0.107	<0.001	<0.001	<1	14.2	-93	<48
12/12/18	<0.001	<0.002	<0.001	12	<0.00005	0.107	<0.001	<0.001	<1	14.5	-93	<48
12/20/18	<0.001	<0.002	0.001	14	<0.00005	0.139	<0.001	<0.001	<1	14.6	-94	<48
12/26/18	<0.001	<0.002	<0.001	8	NRR	0.097	<0.001	<0.001	<1	14.8	-95	<48

[1]Samples retrieved from QT-4 following a reservoir fill and weekly as well as prolonged storage of water in reservoir (for operational procedures). Trace metals have different reporting limits as they were analyzed at different District laboratories.
[2]EC=electrical conductivity; TDS=total dissolved solids.
[3]NL: No limit.
[4]ND: Not analyzed due to insufficient samples.
[5]NRR: No reportable result due to QA/QC failure during laboratory analysis.
[6] Reporting limits changed to 0.5 mg/L in July 2018 due to the change in test equipment.
[7]Relative to Chicago City Datum (579.48 ft above mean sea level) at intersection of Madison and State Streets.

TABLE 6: ANALYSIS OF FILL EVENT WATER STORED IN THE THORNTON TRANSITIONAL RESERVOIR LOCATED AT THE THORNTON SITE AND SAMPLED DURING 2018[1]

Date sampled	pH	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH_3-N[6]	Phenol	Ag	As	B	Ba
						mg/L							
02/23/18	7.1	322	3	<0.005	0.13	103	44	0.23	<0.005	<0.001	<0.020	0.031	0.0331
02/28/18	6.4	360	3	<0.005	0.14	102	49	0.23	<0.005	<0.001	<0.020	0.044	0.0297
03/07/18	7.2	336	<2	<0.005	0.15	114	50	0.33	<0.005	<0.001	<0.020	0.053	0.0270
03/15/18	7.1	334	<2	<0.005	0.15	103	43	0.24	<0.005	<0.001	<0.020	0.054	0.0214
03/21/18	7.3	446	ND[3]	<0.005	0.19	109	122	0.27	<0.005	<0.001	<0.020	0.084	0.0208
03/29/18	7.0	380	<2	<0.005	0.17	106	74	0.28	<0.005	<0.001	<0.020	0.047	0.0210
04/05/18	6.9	386	<2	<0.005	0.14	109	70	0.24	<0.005	0.001	<0.050	0.057	0.0253
04/12/18	7.0	392	ND	<0.005	<0.10	113	67	NRR	<0.005	0.001	<0.050	0.058	0.0260
04/19/18	7.9	392	4	<0.005	0.17	113	79	<0.10	<0.005	0.001	<0.050	0.055	0.0218
04/25/18	7.0	398	9	<0.005	0.16	114	82	<0.10	<0.005	0.003	<0.050	0.066	0.0306
05/03/18	7.8	394	ND	<0.005	0.15	114	85	<0.10	<0.005	<0.005	<0.050	0.059	<0.0200
05/10/18	8.9	454	ND	0.005	0.19	124	100	0.25	<0.005	<0.005	<0.050	0.071	0.0202
05/16/18	7.8	480	<2	<0.005	0.20	124	NRR[4]	0.22	<0.005	<0.005	<0.050	0.076	<0.0200
05/23/18	6.2	458	3	<0.005	0.16	127	107	0.15	<0.005	<0.005	<0.050	0.073	<0.0200
05/31/18	6.8	518	3	<0.005	0.16	129	117	<0.10	<0.005	<0.005	<0.050	0.066	<0.0200
06/07/18	8.9	548	3	<0.005	0.21	128	128	0.26	<0.005	<0.005	<0.050	0.084	<0.0200
06/14/18	6.9	620	<2	<0.005	0.16	135	128	0.11	<0.005	<0.005	<0.050	0.074	0.0207
06/21/18	7.7	528	<2	<0.005	0.18	128	<5	0.14	<0.005	<0.005	<0.050	0.080	0.0218
06/25/18	7.0	460	3	<0.005	0.18	93	90	0.17	<0.005	<0.005	<0.050	0.080	0.0226
07/05/18	7.3	412	5	<0.005	0.16	93	99	<0.50	<0.005	<0.003	0.002	0.082	0.0184
07/12/18	7.3	376	8	<0.005	0.20	100	119	<0.50	0.005	<0.003	0.002	0.093	0.0187
07/18/18	8.9	474	4	<0.005	0.20	99	119	<0.50	<0.005	<0.003	0.002	0.092	0.0200
07/26/18	9.4	534	5	<0.005	0.20	102	92	<0.50	<0.005	<0.003	0.002	0.101	0.0192
08/02/18	NA[3]	546	5	<0.005	0.20	104	121	<0.50	<0.005	<0.003	0.002	0.106	0.0213
08/09/18	6.4	556	3	<0.005	0.21	106	144	<0.50	<0.005	<0.003	0.002	0.107	0.0219
08/16/18	6.8	524	<2	0.011	0.20	112	153	<0.50	<0.005	<0.003	0.002	0.121	0.0228
08/23/18	8.9	676	<2	<0.005	0.23	112	164	<0.50	<0.005	<0.003	0.002	0.119	0.0225
08/30/18	8.9	646	<2	<0.005	0.19	116	NRR	<0.50	<0.005	<0.003	0.002	0.127	0.0221
09/06/18	9.0	430	3	<0.005	0.22	120	162	<0.50	<0.005	<0.003	0.002	0.135	0.0218

TABLE 6 (Continued): ANALYSIS OF FILL EVENT WATER STORED IN THE THORNTON TRANSITIONAL RESERVOIR LOCATED AT THE THORNTON SITE AND SAMPLED DURING 2018[1]

Date sampled	pH	TDS[2]	BOD_5	CN^-	F^-	Cl^-	SO_4^{2-}	NH^3-N^6	Phenol	Ag	As	B	Ba
	mg/L												
09/13/18	8.9	660	3	<0.005	0.20	123	159	<0.50	<0.005	<0.002	0.002	0.151	0.0230
09/20/18	9.0	570	4	0.005	0.26	124	198	<0.50	<0.005	<0.003	0.003	0.179	0.0216
09/27/18	8.6	674	<2	<0.005	0.22	131	229	<0.50	<0.005	<0.003	0.002	0.174	0.0233
10/04/18	8.6	658	5	0.005	0.24	131	199	<0.50	<0.005	<0.003	0.002	0.171	0.0253
10/11/18	8.5	644	<2	<0.005	0.24	133	230	<0.50	<0.005	<0.003	0.002	0.182	0.0214
10/16/18	8.4	652	4	<0.005	0.24	137	226	<0.50	<0.005	<0.003	0.003	0.178	0.0297
10/25/18	8.5	704	<2	<0.005	0.25	140	239	<0.50	<0.005	<0.003	0.002	0.184	0.0272
11/01/18	8.5	678	ND	<0.005	0.27	143	230	<0.50	<0.005	<0.003	0.002	0.186	0.0328
11/08/18	8.7	684	ND	<0.005	0.27	144	NRR	<0.50	<0.005	<0.003	0.002	0.193	0.0299
11/15/18	8.5	1,202	<2	<0.005	0.26	147	244	<0.50	<0.005	<0.003	0.002	0.189	0.0287
11/19/18	8.4	742	<2	<0.005	0.35	151	253	<0.50	<0.005	<0.003	0.002	0.198	0.0283
11/29/18	8.3	758	<2	<0.005	0.26	149	250	<0.50	0.005	<0.003	0.001	0.201	0.0290
12/04/18	8.3	770	<2	<0.005	0.28	150	257	<0.50	<0.005	<0.003	0.001	0.198	0.0304
12/17/18	7.0	760	ND	<0.005	0.26	147	257	<0.50	<0.005	<0.003	0.002	0.221	0.0345
12/27/18	7.2	836	<2	<0.005	0.30	157	280	<0.50	<0.005	<0.003	0.002	0.197	0.0312

TABLE 6 (Continued): ANALYSIS OF FILL EVENT WATER STORED IN THE THORNTON TRANSITIONAL RESERVOIR LOCATED AT THE THORNTON SITE AND SAMPLED DURING 2018[1]

Date Sampled	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Depth of Water
	mg/L								CFU/100 mL	°C	ft
02/23/18	<0.001	0.005	0.006	4.04	0.00005	0.08	0.008	<0.010	2,900	5.8	12
02/28/18	<0.001	0.004	0.005	3.05	<0.00005	0.06	0.005	<0.010	200	7.0	>25
03/07/18	<0.001	0.003	0.005	2.06	<0.00005	0.03	<0.005	<0.010	9	6.0	>25
03/15/18	<0.001	<0.003	0.004	1.21	<0.00005	0.02	<0.005	<0.010	<10	6.0	>25
03/21/18	<0.001	0.003	<0.004	0.94	<0.00005	0.01	0.009	<0.010	<10	6.0	>25
03/29/18	<0.001	0.005	<0.004	1.02	<0.00005	0.02	0.005	<0.010	<10	NA[5]	>5
04/05/18	<0.005	<0.005	0.039	1.42	<0.00005	0.03	0.006	<0.020	<10	4.0	5
04/12/18	<0.005	<0.005	<0.005	1.85	<0.00005	0.04	0.008	<0.020	<10	6.0	5
04/19/18	<0.005	<0.005	<0.005	0.68	<0.00005	0.01	0.006	<0.020	9	8.6	5
04/25/18	<0.005	<0.005	0.006	3.51	<0.00005	0.09	0.011	<0.020	9	11.0	5
05/03/18	<0.005	<0.005	<0.025	0.19	<0.00005	0.01	0.006	<0.030	500	18.0	5
05/10/18	<0.005	<0.005	<0.025	0.41	<0.00005	0.01	0.007	<0.030	40	19.9	5
05/16/18	<0.005	<0.005	<0.025	0.31	<0.00005	0.01	0.006	<0.030	60	18.0	5
05/23/18	<0.005	<0.005	<0.025	0.30	<0.00005	0.02	0.007	<0.030	150	20.0	5
05/31/18	<0.005	<0.005	<0.025	0.23	<0.00005	0.01	0.007	<0.030	7,700	26.0	6
06/07/18	<0.005	<0.005	<0.025	0.15	<0.00005	0.01	0.007	<0.030	140	18.0	5
06/14/18	<0.005	<0.005	<0.025	0.30	<0.00005	0.01	0.007	<0.030	200	25.0	5
06/21/18	<0.005	<0.005	<0.025	0.25	<0.00005	0.01	0.006	<0.030	1100	23.5	9
06/25/18	<0.005	<0.005	<0.025	0.62	<0.00005	0.02	0.005	<0.030	1,200	25.0	20
07/05/18	<0.001	<0.002	0.003	0.61	<0.00005	0.03	0.006	0.021	5,900	29.1	15
07/12/18	<0.001	<0.002	0.003	0.29	<0.00005	0.01	0.006	<0.001	100,000	29.2	15
07/18/18	<0.001	<0.002	0.002	0.18	<0.00005	0.01	0.004	<0.001	5,600	26.0	10
07/26/18	<0.001	<0.002	0.002	0.09	<0.00005	0.01	0.004	<0.001	1,100	26.0	6
08/02/18	<0.001	<0.002	0.002	0.37	<0.00005	0.02	0.005	<0.001	1,400	NA	5
08/09/18	<0.001	<0.002	0.002	0.10	<0.00005	0.01	0.004	<0.001	280	27.0	5
08/16/18	<0.001	<0.002	0.002	0.13	<0.00005	0.01	0.004	<0.001	150	25.7	5
08/23/18	<0.001	<0.002	0.001	0.20	<0.00005	0.01	0.004	<0.001	120	24.5	5
08/30/18	<0.001	<0.002	0.002	0.19	<0.00005	0.02	0.004	<0.001	140	23.0	>5
09/06/18	<0.001	<0.002	0.001	0.11	<0.00005	0.01	0.004	<0.001	640	24.5	>5

TABLE 6 (Continued): ANALYSIS OF FILL EVENT WATER STORED IN THE THORNTON TRANSITIONAL RESERVOIR LOCATED AT THE THORNTON SITE AND SAMPLED DURING 2018

Date Sampled[1]	Cd	Cr	Cu	Fe	Hg	Mn	Ni	Pb	Fecal Coliform	Temp	Depth of Water
	mg/L								CFU/100 mL	°C	ft
09/13/18	<0.001	<0.002	<0.001	0.12	<0.00005	0.01	0.005	<0.001	60	20.5	>5
09/20/18	<0.001	<0.002	<0.001	0.14	<0.00005	0.01	0.005	<0.001	2,200	24.0	>5
09/27/18	<0.001	<0.002	<0.001	0.14	<0.00005	0.02	0.005	<0.001	30	16.5	>5
10/04/18	<0.001	<0.002	<0.001	0.09	<0.00005	0.02	0.005	<0.001	3,100	18.7	>5
10/11/18	<0.001	<0.002	0.001	0.22	<0.00005	0.02	0.005	<0.001	530	14.7	>5
10/16/18	<0.001	0.003	0.002	0.72	<0.00005	0.06	0.006	0.001	120	17.6	>5
10/25/18	<0.001	<0.002	<0.001	0.18	<0.00005	0.03	0.005	<0.001	<10	11.9	>5
11/01/18	<0.001	<0.002	0.001	0.36	<0.00005	0.03	0.005	<0.001	40	10.2	>5
11/08/18	<0.001	<0.002	0.001	0.24	<0.00005	0.02	0.005	<0.001	9	8.2	5
11/15/18	<0.001	<0.002	<0.001	0.12	<0.00005	0.02	0.005	<0.001	30	5.7	5
11/19/18	<0.001	<0.002	0.001	0.15	<0.00005	0.02	0.006	<0.001	9	5.7	>5
11/29/18	<0.001	<0.002	<0.001	0.08	<0.00005	0.01	0.006	<0.001	<10	3.9	5
12/04/18	<0.001	<0.002	<0.001	0.05	<0.00005	0.01	0.006	<0.001	9	7.0	>5
12/17/18	<0.001	<0.002	0.002	0.58	<0.00005	0.03	0.009	0.001	<10	3.2	>5
12/27/18	<0.001	<0.002	0.001	0.39	<0.00005	0.02	0.008	<0.001	<10	5.3	>5

[1]Samples retrieved from the Transitional Reservoir following a reservoir fill and weekly as well as prolonged storage of water in reservoir (for operational procedures). Trace metals have different reporting limits as they were analyzed at different District laboratories.
[2]TDS = total dissolved solids.
[3]ND: Not determined due to insufficient samples.
[4]NRR: No reportable data due to QA/QC failure during laboratory analysis.
[5]NA: No available reading.
[6] Reporting limits changed to 0.5 mg/L in July 2018 due to the change in test equipment.

TABLE 7: EXCEEDANCES[1] DETECTED IN WELLS AT THE THORNTON TRANSITIONAL RESERVOIR SITE DURING 2018

Well	Parameter Exceeding Limit[1]
1	TDS, CN^-, Cl^-, Ag, Mn, Ni
2	pH, CN^-, Ag, As, Mn
3	TDS, Cl^-, $SO4^{2-}$, Ba, Cr, Fe, Mn
4	Ag, Mn

[1]Concentrations of analytes exceed upper limits of 95% confidence intervals for background samples.