

*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

***MONITORING AND RESEARCH  
DEPARTMENT***

*REPORT NO. 24-20*

*TUNNEL AND RESERVOIR PLAN*

*DES PLAINES TUNNEL SYSTEM*

*ANNUAL GROUNDWATER MONITORING REPORT*

*FOR 2023*

*July 2024*

*Protecting Our Water Environment*



**Metropolitan Water Reclamation District of Greater Chicago**

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July 11, 2024

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Ms. Joey Logan-Pugh  
Chief  
Bureau of Water  
Illinois Environmental Protection Agency  
P. O. Box 19276  
Springfield, IL 62794-9276

Dear Ms. Logan-Pugh:

Subject: Tunnel and Reservoir Plan Des Plaines Tunnel System Annual  
Groundwater Monitoring Report for 2023

The report entitled “Tunnel and Reservoir Plan Des Plaines Tunnel System Annual  
Groundwater Monitoring Report for 2023” is attached.

Very truly yours,

Albert E. Cox, Ph.D.  
Environmental Monitoring and Research Manager  
Monitoring and Research Department

AC:EE:lf  
Attachment  
cc: Mr. Ryan Bahr (USEPA Region 5 - WC15J)  
Mr. E. Podczewinski  
Dr. H. Zhang  
cc w/o att: Mr. J. Murray  
Mr. A. Gronski

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**TUNNEL AND RESERVOIR PLAN  
DES PLAINES TUNNEL SYSTEM  
ANNUAL GROUNDWATER MONITORING REPORT  
FOR 2023**

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## LIST OF ABBREVIATIONS

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Abbreviation	Definition
°C	degrees Celsius
CCD	Chicago City Datum
CFU	colony forming units
Cl <sup>-</sup>	chloride
District	Metropolitan Water Reclamation District of Greater Chicago
EC	electrical conductivity
FC	fecal coliform
IEPA	Illinois Environmental Protection Agency
L	liter
m	meter
mg	milligram
mL	milliliter
mS	millisiemens
NH <sub>3</sub> -N	ammonia nitrogen
SO <sub>4</sub> <sup>2-</sup>	sulfate
TARP	Tunnel and Reservoir Plan
TDS	total dissolved solids
Temp.	temperature
TOC	total organic carbon

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# ANNUAL DATA FOR MONITORING WELLS

## Introduction

All monitoring wells are located along the 13A extension, south leg, middle leg, and north leg of the Des Plaines Tunnel System ([Figure 1](#)). The monitoring wells were sampled based on the modified groundwater monitoring program for the Metropolitan Water Reclamation District of Greater Chicago's (District's) Tunnel and Reservoir Plan (TARP) as briefly described below.

## Modified Groundwater Monitoring Program

In a letter dated May 14, 2021, the Illinois Environmental Protection Agency (IEPA) approved a modified TARP groundwater monitoring program for the District's Calumet, Mainstream, Des Plaines, and Upper Des Plaines tunnel systems effective January 2021. The modification of the TARP groundwater monitoring program was based on the key findings from a three-year fill event-based groundwater monitoring study conducted by the District from 2017 to 2019 and was submitted to the IEPA in a report dated July 30, 2020.

Under the modified monitoring program, nine fill event-based monitoring wells in the Des Plaines Tunnel System (QD-27, QD-29, QD-30, QD-31, QD-33, QD-34, QD-36, QD-46, and QD-54) are sampled for two tunnel fill events per year, usually following storm events. Fecal coliforms (FC) in these wells were detected in 10 percent or more of samples collected during the period 1995–2013. In addition, well QD-57, previously sampled annually, is monitored according to this schedule. Fecal coliforms were detected in this well in all samples collected during 2017–2019. The criterion that triggers fill event sampling is that the level of water in the TARP Mainstream tunnels reaches -150 feet Chicago City Datum (CCD). The fill event-based monitoring wells are sampled in two groups. At each fill event, the first group of wells (QD-29, QD-30, QD-54, and QD-57) is sampled during the first week of the fill event, and the second group of wells (QD-27, QD-31, QD-33, QD-34, QD-36, and QD-46) is sampled during the second week of the fill event. For the first fill event, samples are analyzed for all parameters including pH, temperature (Temp.), electrical conductivity (EC), total dissolved solids (TDS), hardness, ammonia nitrogen (NH<sub>3</sub>-N), total organic carbon (TOC), chloride (Cl<sup>-</sup>), sulfate (SO<sub>4</sub><sup>2-</sup>), and FC. For the second fill event, samples are analyzed for FC only. Groundwater elevations in the monitoring wells are measured during each sampling event.

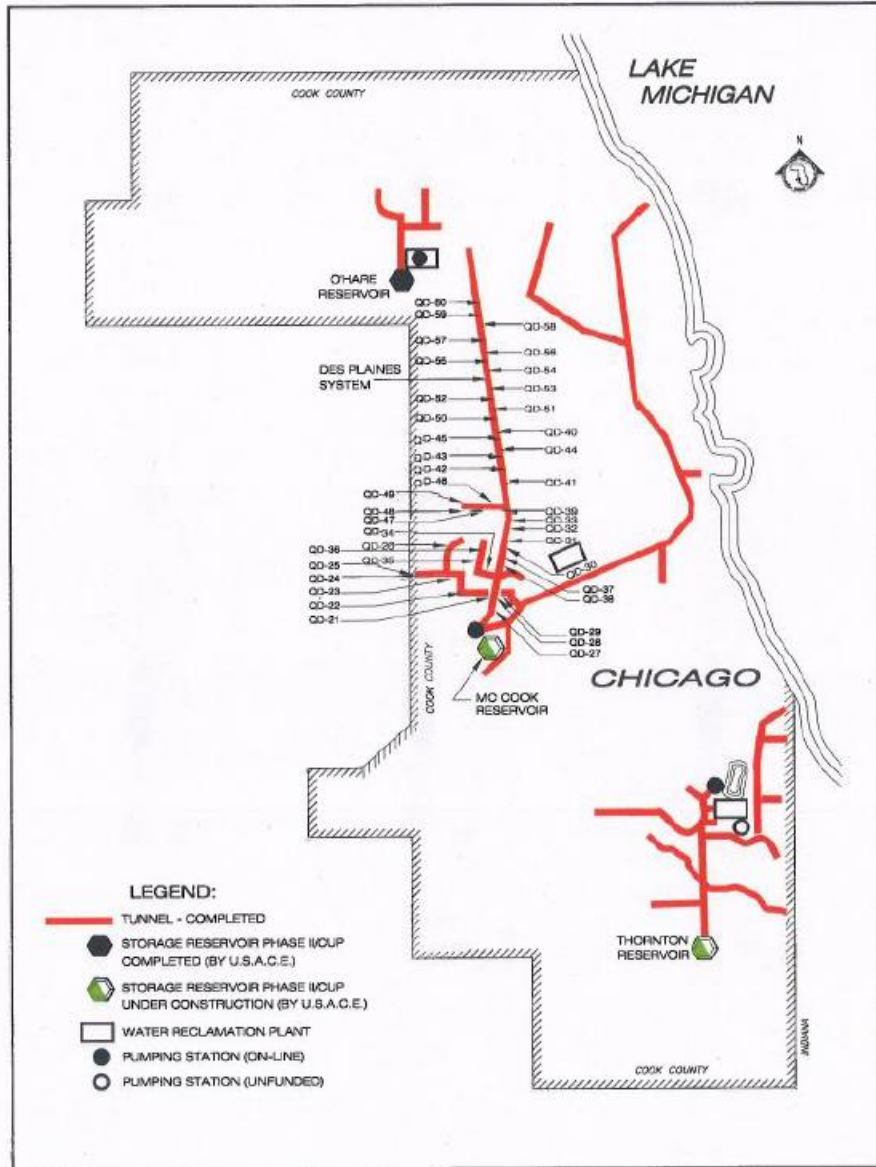
The other 30 wells associated with the Des Plaines Tunnel System, referred to as annual monitoring wells, are sampled once per year. These wells had FC detected in less than 10 percent of samples during the period 1995–2013.

## Summary of Monitoring Well Data

During the first half of 2023, there were no tunnel fill events. To substitute for the fill event sampling, the ten Des Plaines monitoring wells were sampled during the period from May 31 to June 2, 2023. In the second half of the year, one tunnel fill event occurred on July 2, 2023, and lasted till July 7, 2023. Fill event-based sampling was conducted for the 10 Des Plaines monitoring



FIGURE 1: MAP OF MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM



wells during the period from July 3 to July 13, 2023. Since the first two sampling events (June and July) were so close together, additional sampling was conducted for FC testing from November 15 to November 30, 2024. The groundwater analytical data and physical parameters for fill event-based monitoring wells QD-27, QD-29, QD-30, QD-31, QD-33, QD-34, QD-36, QD-46, QD-54, and QD-57 is presented in Table 1.

A majority of the wells showed undetectable levels of FC during the first and third sampling events. Wells QD-27, QD-29, QD-31, QD-33, and QD-57 showed detectable levels of FC in the second sampling event (July) in response to the tunnel fill event. However, these FC detections were transient, and subsequently FC in all wells returned to undetectable levels at the third sampling event.

The analytical data for groundwater from the 30 wells sampled once per year are presented in Table 2. Fecal coliforms in all the annual monitoring wells were undetectable (<1 CFU/100 mL).

TABLE 1: ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER SAMPLED FROM FILL EVENT MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2023<sup>1</sup>

Well	Sampled Date	pH	EC mS/m	TDS	TOC	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Temp. °C	Water Elevation <sup>2</sup> feet	Fecal Coliform CFU/100 mL	Recharge Time hours
QD-27	06/01/23	7.4	217	1,474	NDR <sup>3</sup>	529	37	28.9	450	13.7	-147	<1	<48
	07/12/23	7.2	205	1,462	15.2	505	59	26.1	542	13.3	-152	2	<48
	11/30/23	7.2	207	—	—	—	—	—	—	12.9	-152	<1	<48
QD-29	06/01/23	7.4	217	1,714	9.6	470	486	1.7	677	14.0	-54	<1	<4
	07/03/23	7.4	292	1,928	8.9	526	494	1.6	760	13.7	-43	60	<4
	11/16/23	7.1	159	—	—	—	—	—	—	13.7	-58	<1	<4
QD-30	06/01/23	7.3	83	624	<5.0	97	129	<0.3	345	13.4	-77	<1	<48
	07/05/23	7.4	112	694	<5.0	96	149	<0.3	435	13.7	-69	<1	<48
	11/16/23	7.3	81	—	—	—	—	—	—	13.2	-74	<1	<48
QD-31	06/01/23	7.6	123	942	<5.0	136	180	<0.3	217	14.0	-190	1	<4
	07/13/23	7.5	112	870	<5.0	127	170	<0.3	197	12.9	-189	3,800	<4
	11/30/23	7.3	114	—	—	—	—	—	—	12.4	-193	<1	<4
QD-33	06/01/23	8.2	214	1,472	NDR	377	200	0.45	27	13.7	-197	<1	<48
	07/03/23	8.5	109	1,422	<5.0	308	179	<0.3	22	14.1	-195	2,000	<48
	11/30/23	8.4	194	—	—	—	—	—	—	12.7	-208	<1	<48
QD-34	05/31/23	7.0	160	1,256	<5.0	339	213	0.52	575	13.6	-20	2	<4
	07/11/23	6.9	151	1,228	<5.0	289	223	0.77	411	13.7	-46	<1	<4
	11/15/23	7.0	157	—	—	—	—	—	—	13.7	-51	<1	<4

TABLE 1 (Continued): ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUND-WATER SAMPLED FROM FILL EVENT MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2023

Well	Sampled Date	pH	EC mS/m	TDS	TOC	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Temp. °C	Water Elevation <sup>2</sup> feet	Fecal Coliform CFU/100 mL	Recharge Time hours
QD-36	05/31/23	6.9	120	1,046	<5.0	120	280	<0.3	668	13.3	-64	13	<4
	07/11/23	6.8	127	1,126	<5.0	119	290	0.37	705	14.9	-65	<1	<4
	11/15/23	6.9	116	—	—	—	—	—	—	12.8	-65	<1	<4
QD-46	05/31/23	7.9	73	554	<5.0	11	119	<0.3	71	13.3	-138	14	<4
	07/11/23	7.8	74	570	<5.0	12	136	<0.3	101	13.4	-124	<1	<4
	11/15/23	7.8	70	—	—	—	—	—	—	12.7	-136	<1	<4
QD-54	06/01/23	9.4	55	396	<5.0	18	129	<0.3	26	13.4	-50	<1	<48
	07/05/23	9.3	75	462	<5.0	21	159	<0.3	33	14.3	-40	<1	<48
	11/16/23	9.3	55	—	—	—	—	—	—	12.4	-51	<1	<48
QD-57	06/01/23	8.7	45	350	<5.0	13	49	<0.3	17	11.7	-121	<1	<48
	07/05/23	8.4	59	352	<5.0	13	57	<0.3	25	14.1	-121	260	<48
	11/16/23	8.7	44	—	—	—	—	—	—	11.4	-122	<1	<48

<sup>1</sup>Chemistry parameters were analyzed for the first two sampling events.

<sup>2</sup>Relative to Chicago City Datum (579.48 feet above mean sea level) at intersection of State and Madison Streets.

<sup>3</sup>No reportable result due to improper preservation of the sample.

TABLE 2: ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER SAMPLED FROM ANNUAL MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2023

Well	Sample Date	pH	EC mS/m	TDS	TOC	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup> mg/L	NH <sub>3</sub> -N	Hardness	Temp. °C	Water Elevation <sup>1</sup> feet	Fecal Coliform CFU/100 mL
QD-21	02/22/23	7.1	169	1,256	<5.0	343	300	0.4	842	13.1	-78	<1
QD-22	06/21/23	6.8	108	820	<5.0	116	201	0.3	609	15.0	-16	<1
QD-23	06/21/23	6.8	143	1,128	<5.0	197	308	0.5	747	14.7	-27	<1
QD-24	09/21/23	7.0	115	1,010	<5.0	171	217	0.7	592	12.7	21	<1
QD-25	02/22/23	7.0	84	1,426	<5.0	472	275	0.9	690	11.0	29	<1
QD-26	01/19/23	7.4	61	446	<5.0	9	99	<0.3	373	12.0	-80	<1
QD-28	02/22/23	7.2	101	712	<5.0	170	146	1.4	430	13.5	-89	<1
QD-32	01/31/23	8.1	235	1,952	<5.0	509	221	<0.3	33	11.3	-200	<1
QD-35	02/22/23	7.1	108	848	<5.0	103	307	0.5	640	13.3	-63	<1
QD-37	03/23/23	7.7	162	1,210	<5.0	264	318	<0.3	318	13.9	-191	<1
QD-38	03/23/23	7.7	101	692	<5.0	166	102	0.4	249	12.2	-211	<1
QD-39	01/31/23	8.4	90	722	<5.0	27	93	<0.3	20	11.0	-66	<1
QD-40	01/31/23	9.5	84	654	<5.0	15	335	<0.3	20	12.8	-75	<1
QD-41	03/23/23	7.6	78	628	<5.0	13	329	<0.3	382	13.3	-135	<1
QD-42	01/26/23	7.7	111	656	<5.0	20	293	0.3	343	11.5	-97	<1
QD-43	03/23/23	7.4	81	618	<5.0	44	223	0.3	445	12.2	-130	<1
QD-44	04/21/23	7.6	66	548	<5.0	22	216	0.3	323	11.5	-10	<1
QD-45	04/21/23	8.5	65	516	<5.0	19	220	<0.3	103	11.7	7	<1
QD-47	05/11/23	7.7	65	480	<5.0	15	161	<0.3	222	15.2	13	<1
QD-48	05/11/23	8.4	62	486	<5.0	8	278	<0.3	245	15.5	-180	<1
QD-49	07/25/23	8.0	94	562	<5.0	13	205	<0.3	203	14.7	-182	<1
QD-50	07/27/23	9.5	86	662	<5.0	12	281	<0.3	8	12.5	-147	<1
QD-51	07/27/23	9.3	71	538	<5.0	13	127	<0.3	4	13.1	-107	<1
QD-52	07/27/23	9.0	82	500	<5.0	16	148	<0.3	14	14.5	-125	<1

TABLE 2 (Continued): ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUND-WATER SAMPLED FROM ANNUAL MONITORING WELLS IN THE DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2023

Well	Sample Date	pH	EC mS/m	TDS	TOC <sup>1</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	NH <sub>3</sub> -N	Hardness	Temp. °C	Water Elevation <sup>1</sup> feet	Fecal Coliform CFU/100 mL
				-----mg/L-----								
QD-53	09/28/23	9.2	76	580	<5.0	19	168	<0.3	8	13.4	-129	<1
QD-55	9/28//23	7.8	54	480	<5.0	16	193	<0.3	175	12.9	-65	<1
QD-56	09/29/23	8.4	36	342	<5.0	12	10	<0.3	51	12.6	-101	<1
QD-58	09/28/23	7.8	33	290	<5.0	13	2	<0.3	74	11.6	-117	<1
QD-59	11/01/23	8.6	41	282	<5.0	64	12	<0.3	182	11.6	-39	<1
QD-60	11/01/23	7.9	48	352	<5.0	45	98	0.4	227	12.0	-90	<1

<sup>1</sup>Relative to Chicago City Datum (579.48 feet above mean sea level) at intersection of State and Madison Streets.