

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

***MONITORING AND RESEARCH
DEPARTMENT***

REPORT NO. 25-24

TUNNEL AND RESERVOIR PLAN

DES PLAINES TUNNEL SYSTEM

ANNUAL GROUNDWATER MONITORING REPORT

FOR 2024

July 2025

Protecting Our Water Environment



Metropolitan Water Reclamation District of Greater Chicago

CECIL LUE-HING RESEARCH AND DEVELOPMENT COMPLEX
6001 WEST PERSHING ROAD CICERO, ILLINOIS 60804-4112

BOARD OF COMMISSIONERS
Kari K. Steele
President
Patricia Theresa Flynn
Vice President
Marcelino García
Chairman of Finance
Precious Brady-Davis
Yumeka Brown
Cameron Davis
Beth McElroy Kirkwood
Eira L. Corral Sepúlveda
Sharon Waller

July 8, 2025

Ms. Joey Logan-Pugh
Chief
Bureau of Water
Illinois Environmental Protection Agency
2520 W. Iles Ave.
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 2024

The report entitled “Tunnel and Reservoir Plan Des Plaines Tunnel System Annual Groundwater Monitoring Report for 2024” is attached.

Very truly yours,

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

AC:lf
Attachment
cc: Mr. Ryan Bahr (USEPA Region 5 - WC15J)
Mr. E. Podczerwinski
Dr. H. Zhang
cc w/o att: Mr. P. Desai
Mr. E. Staudacher

Metropolitan Water Reclamation District of Greater Chicago
100 East Erie Street Chicago, Illinois 60611-2803 (312) 751-5600

**TUNNEL AND RESERVOIR PLAN
DES PLAINES TUNNEL SYSTEM
ANNUAL GROUNDWATER MONITORING REPORT
FOR 2024**

By

**Essam El-Naggar
Environmental Soil Scientist**

**Guanglong Tian
Principal Environmental Scientist**

**Albert Cox
Environmental Monitoring and Research Manager**

**Heng Zhang
Assistant Director of Monitoring and Research
Environmental Monitoring and Research Division**

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	ii
LIST OF FIGURES	iii
LIST OF ABBREVIATIONS	iv
ANNUAL DATA FOR MONITORING WELLS	1
Introduction	1
Modified Groundwater Monitoring Program	1
Summary of Monitoring Well Data	1

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
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 2024	4
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 2024	6

LIST OF FIGURES

<u>Figure No.</u>		<u>Page</u>
1	Map of Monitoring Wells in the Des Plaines Tunnel System	2

LIST OF ABBREVIATIONS

Abbreviation	Definition
°C	degrees Celsius
CCD	Chicago City Datum
CFU	colony forming units
Cl ⁻	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 ₃ -N	ammonia nitrogen
SO ₄ ²⁻	sulfate
TARP	Tunnel and Reservoir Plan
TDS	total dissolved solids
Temp.	temperature
TOC	total organic carbon

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, which was submitted to the IEPA in a report dated July 30, 2020.

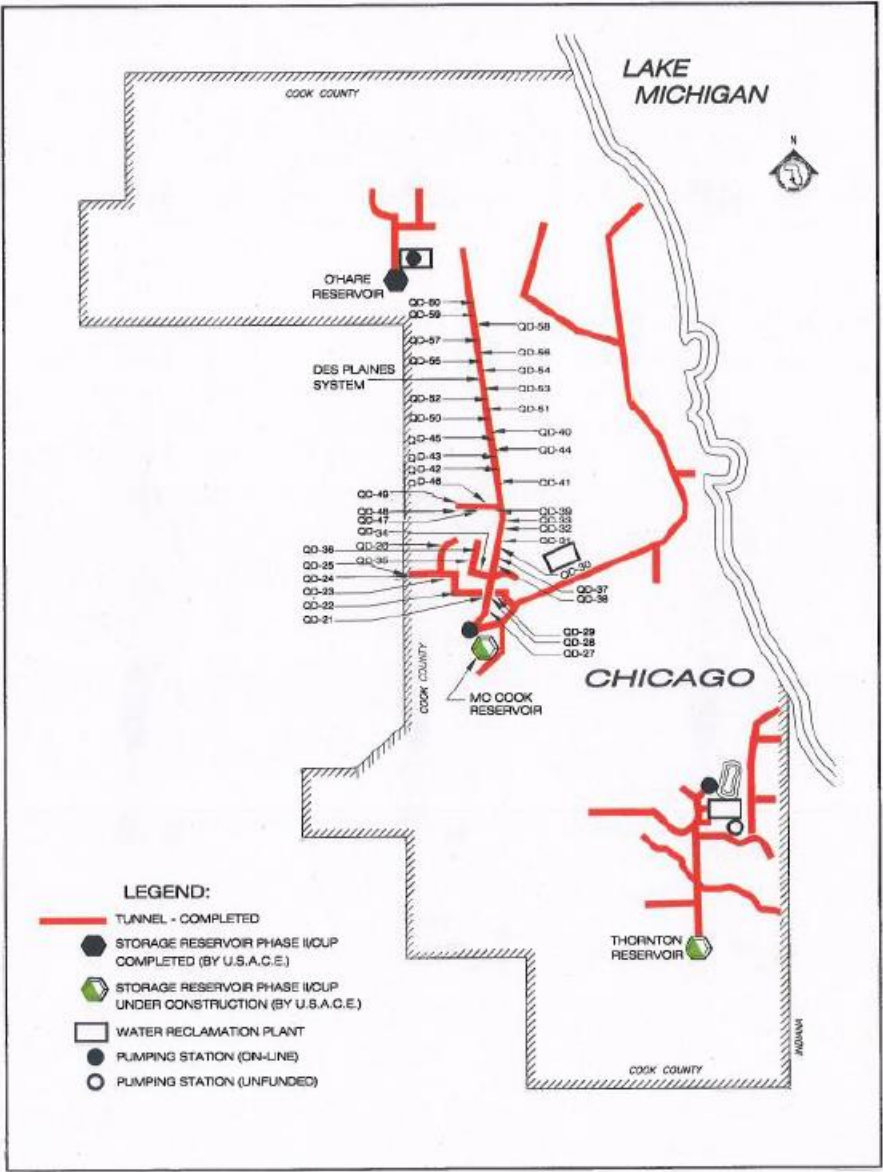
Under the modified monitoring program, nine fill event-based monitoring wells in the Des Plaines Tunnel System (QD-27, QD-29, QD-30, QD-31, QD-33, QD-34, QD-36, QD-46, and QD-54) are sampled for two tunnel fill events per year, usually following storm events. Fecal coliforms (FC) in these wells were 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 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 (NH₃-N), total organic carbon (TOC), chloride (Cl⁻), sulfate (SO₄²⁻), 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 2024, 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 June 5 to June 13, 2024. In the second half of the year, one tunnel fill event occurred on July 15, 2024, and lasted till July 27, 2024. Fill event-based sampling was conducted for the 10 Des Plaines

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



monitoring wells during the period from July 18 to July 26, 2024. Since the two sampling events were so close together (June and July), one additional sampling for the year was conducted from September 19 to October 3, 2024, for FC testing. 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 are presented in Table 1.

All monitoring wells showed undetectable levels of FC (<1 CFU/100 mL) during the first and third sampling events except for wells QD-31 and QD-33. Wells QD-27, QD-31, QD-33, QD-54, 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 most of the monitored 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) except for well QD-55.

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 2024¹

Well	Sampled Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻	NH ₃ -N	Hardness	Temp. °C	Water Elevation ² feet	Fecal Coliform CFU/100 mL	Recharge Time hours
				-----mg/L-----									
QD-27	06/13/24	7.2	219	1,344	14.2	512	47	28.2	462	13.7	-147	<1	<48
	07/25/24	7.0	279	1,456	14.7	519	37	30.4	488	13.5	-147	11	<48
	10/03/24	7.3	207	—	—	—	—	—	—	12.9	-152	<1	<48
QD-29	06/06/24	7.4	202	1,650	7.4	453	354	1.5	643	13.9	-49	<1	<4
	07/18/24	7.3	214	1,768	7.1	480	294	1.7	637	14.4	-44	<1	<4
	10/02/24	7.3	209	—	—	—	—	—	—	13.7	-49	<1	<4
QD-30	06/06/24	7.2	95	740	<5.0	97	175	<0.3	433	13.7	-69	<1	<48
	07/18/24	7.1	100	858	<5.0	93	192	<0.3	479	13.7	-54	<1	<48
	10/03/24	7.2	90	—	—	—	—	—	—	13.2	-71	<1	<48
QD-31	06/13/24	7.4	122	854	<5.0	130	187	<0.3	218	14.0	-186	<1	<4
	07/25/24	7.5	133	784	<5.0	106	137	<0.3	176	12.9	-140	14,000	<4
	10/03/24	7.5	115	—	—	—	—	—	—	13.2	-184	2	<4
QD-33	06/13/24	8.5	210	1,496	<5.0	345	199	<0.3	24	13.5	-185	<1	<48
	07/25/24	8.4	234	1,292	<5.0	276	160	<0.3	17	13.2	-172	5,900	<48
	10/03/24	8.4	198	—	—	—	—	—	—	13.5	-185	39	<48
QD-34	06/05/24	7.0	125	1,018	<5.0	176	227	0.4	627	14.1	-44	<1	<4
	07/26/24	6.9	116	936	<5.0	148	217	1.0	585	14.1	-39	<1	<4
	10/02/24	7.0	141	—	—	—	—	—	—	13.4	-47	<1	<4

TABLE 1 (Continued): 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 2024¹

Well	Sampled Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻ mg/L	NH ₃ -N	Hardness	Temp. °C	Water Elevation ² feet	Fecal Coliform CFU/100 mL	Recharge Time hours
QD-36	06/05/24	6.9	120	1,034	<5.0	127	293	0.4	739	12.6	-54	<1	<4
	07/26/24	6.9	114	1,016	<5.0	115	272	<0.3	696	13.0	-51	<1	<4
	10/02/24	6.9	118	—	—	—	—	—	—	12.2	-62	<1	<4
QD-46	06/05/24	7.7	72	566	<5.0	11	134	<0.3	101	13.0	-131	<1	<4
	07/26/24	7.6	71	528	<5.0	12	131	0.63	99	13.4	-105	<1	<4
	10/02/24	7.6	70	—	—	—	—	—	—	12.5	-134	<1	<4
QD-54	06/06/24	9.1	74	456	<5.0	21	145	<0.3	31	13.5	-47	<1	<48
	07/18/24	9.2	60	494	<5.0	22	151	<0.3	40	13.3	-31	1	<48
	09/26/24	8.9	58	—	—	—	—	—	—	13.0	-52	<1	<48
QD-57	06/06/24	8.5	61	356	<5.0	13	49	<0.3	22	12.0	-120	<1	<48
	07/18/24	8.6	44	390	<5.0	11	65	0.3	35	11.9	-73	74	<48
	09/26/24	8.4	44	—	—	—	—	—	—	11.8	-122	<1	<48

¹Chemistry parameters were analyzed for the first two sampling events.

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

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 2024

Well	Sample Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻	NH ₃ -N	Hardness	Temp. °C	Water Elevation ¹ feet	Fecal Coliform CFU/100 mL
							mg/L					
QD-21	03/27/24	7.1	194	1,032	<5.0	293	262	0.5	703	13.2	-32	<1
QD-22	03/27/24	7.0	128	848	<5.0	110	193	0.4	612	13.6	-12	<1
QD-23	03/27/24	6.9	171	1,090	<5.0	192	296	0.6	750	13.8	-21	<1
QD-24	05/30/24	7.0	109	978	<5.0	153	221	0.6	604	12.6	23	<1
QD-25	05/30/24	6.8	188	1,430	<5.0	489	268	0.7	674	11.7	33	<1
QD-26	08/08/24	7.2	65	506	<5.0	9	89	<0.3	367	13.4	3	<1
QD-28	05/30/24	7.1	108	780	<5.0	193	163	1.4	457	13.7	-82	<1
QD-32	08/08/24	9.2	246	1,930	<5.0	501	216	<0.3	21	12.8	-104	<1
QD-35	07/02/24	7.0	101	938	<5.0	79	249	0.4	561	14.0	-59	<1
QD-37	02/15/24	7.9	157	1,152	<5.0	269	276	<0.3	201	13.5	-192	<1
QD-38	02/15/24	8.6	86	602	<5.0	155	96	<0.3	100	12.7	-158	<1
QD-39	02/15/24	8.3	96	770	<5.0	27	97	<0.3	18	11.9	-157	<1
QD-40	03/21/24	9.4	86	686	<5.0	16	342	<0.3	26	12.8	-122	<1
QD-41	03/21/24	7.5	75	694	<5.0	12	306	<0.3	353	13.1	-135	<1
QD-42	03/21/24	7.5	83	692	<5.0	18	283	0.4	352	12.5	-94	<1
QD-43	08/08/24	7.2	82	736	<5.0	42	211	<0.3	412	12.7	-126	<1
QD-44	10/17/24	7.8	67	538	<5.0	21	199	0.3	295	11.7	-12	<1
QD-45	10/17/24	8.7	65	512	<5.0	19	202	0.3	83	12.2	6	<1
QD-47	10/17/24	7.6	63	476	<5.0	14	148	<0.3	234	13.9	13	<1
QD-48	10/17/24	8.8	50	404	<5.0	8	223	0.3	172	13.4	-169	<1
QD-49	11/22/24	8.9	55	416	<5.0	12	182	<0.3	219	12.8	-185	<1
QD-50	08/28/24	9.7	83	634	<5.0	12	253	<0.3	7	12.5	-102	<1
QD-51	04/18/24	9.2	67	498	<5.0	14	143	<0.3	6	12.4	-110	<1
QD-52	04/18/24	8.7	62	466	<5.0	17	161	<0.3	18	13.8	-93	<1

TABLE 2 (Continued): 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 2024

Well	Sample Date	pH	EC mS/m	TDS	TOC	Cl ⁻	SO ₄ ²⁻	NH ₃ -N	Hardness	Temp. °C	Water Elevation ¹ feet	Fecal Coliform CFU/100 mL
				-----mg/L-----								
QD-53	04/18/24	9.1	74	596	<5.0	20	187	<0.3	7	13.5	-152	<1
QD-55	08/08/24	8.1	56	426	<5.0	14	189	<0.3	168	15.3	-41	1
QD-56	05/16/24	8.7	45	350	<5.0	13	48	<0.3	20	12.2	-112	<1
QD-58	05/16/24	7.8	34	232	<5.0	12	2	<0.3	114	12.2	-110	<1
QD-59	05/16/24	8.4	42	274	<5.0	60	11	<0.3	178	12.3	-37	<1
QD-60	05/16/24	7.7	52	356	<5.0	44	99	0.3	234	12.8	-87	<1

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