

Metropolitan Water Reclamation District of Greater Chicago

MONITORING AND RESEARCH DEPARTMENT

REPORT NO. 25-27

TUNNEL AND RESERVOIR PLAN

UPPER DES PLAINES TUNNEL SYSTEM

ANNUAL GROUNDWATER MONITORING REPORT

FOR 2024

July 2025

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

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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 Upper Des Plaines Tunnel System Annual Groundwater Monitoring Report for 2024

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

Very truly yours,

Albert Cox

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

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TUNNEL AND RESERVOIR PLAN
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LIST OF ABBREVIATIONS

Abbreviation	Definition
°C	degrees Celsius
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
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 AND OBSERVATION WELLS

Introduction

This system consists of two subsystems, Upper Des Plaines (UDP) 20 and UDP 21. The UDP 20 subsystem contains six monitoring wells, MW-1 through MW-6, while the UDP 21 subsystem contains three monitoring wells, MW-7 through MW-9 (Figure 1). Groundwater elevations in the monitoring wells were measured during each sampling event. In addition, groundwater elevations were measured biweekly since these wells also function as observation wells. 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 of a three-year fill event-based groundwater monitoring study conducted by the District from 2017 to 2019 and submitted to the IEPA in a report dated July 30, 2020.

Under the modified monitoring program, four UDP wells (MW-5, MW-6, MW-7, and MW-8) 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 1995–2013. The criterion that triggers fill event sampling is that the water from the UDP Tunnel System starts to enter the Gloria Alitto Majewski Reservoir. Sampling is conducted during the first week following each 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_3-N), total organic carbon (TOC), chloride (Cl^-), sulfate (SO_4^{2-}), and FC. For the second fill event, samples are analyzed for FC only.

The other five wells associated with the UDP 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 Data for Monitoring and Observation Wells

Monitoring Wells. During 2024, the UDP fill event-based monitoring wells MW-5, MW-6, MW-7, and MW-8 were sampled following the two fill events, which occurred on January 26 and July 14, 2024. The groundwater analytical data and physical parameters for the fill event-based monitoring wells are presented in Table 1.

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

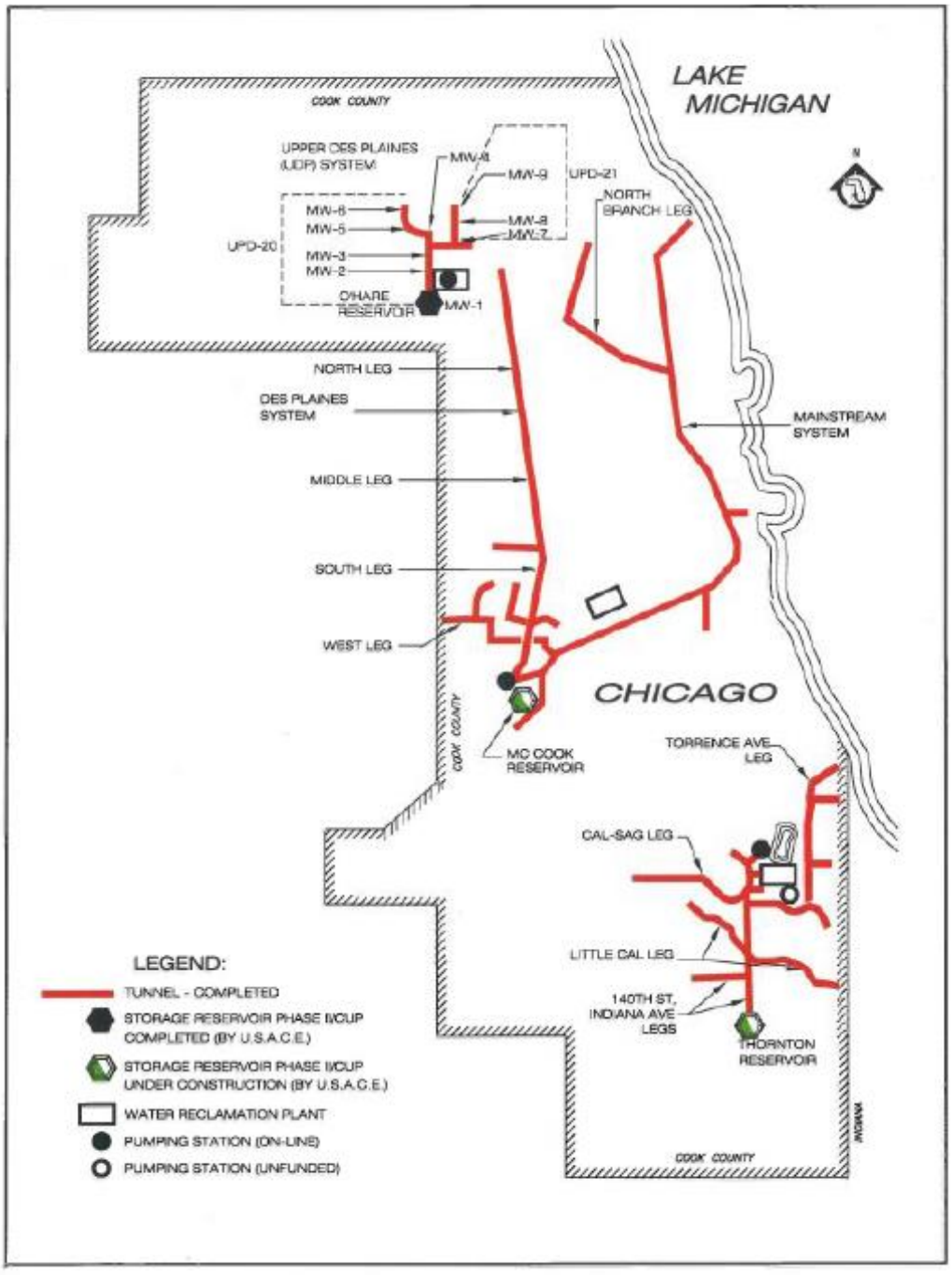


TABLE 1: ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER SAMPLED FROM FILL EVENT MONITORING WELLS IN THE UPPER DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN DURING 2024[1]

Well	Sample 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									
MW-5	02/01/24	8.6	67	460	<5.0	138	115	<0.30	109	13.7	-56	<1	<48
	07/19/24	8.2	79	—	—	—	—	—	—	15.0	-48	1,300	<48
MW-6	02/02/24	7.4	63	580	<5.0	37	253	0.47	290	14.9	11	<1	<4
	07/17/24	7.8	107	—	—	—	—	—	—	14.4	69	6,900	<4
MW-7	02/02/24	7.7	92	758	<5.0	42	351	0.53	470	13.9	49	<1	<4
	07/17/24	7.4	115	—	—	—	—	—	—	16.2	28	7	<4
MW-8	02/01/24	7.4	90	690	<5.0	154	253	<0.30	291	14.7	-31	<1	<48
	07/19/24	7.9	111	—	—	—	—	—	—	15.1	-28	3	<48

[1]Chemistry parameters need to be analyzed for first fill event only.
[2]Relative to Chicago City Datum (579.48 feet above mean sea level) at intersection of State and Madison Streets.

Fecal coliforms were not detected following the first fill event on January 26, 2025; however, FCs were detected at wells MW-5, MW-6, MW-7, and MW-8 during the second fill event on July 14, 2024.

The analytical data for groundwater sampled from the five wells sampled once per year are presented in Table 2. Fecal coliforms in all annual wells except for MW-9 were undetectable.

Observation Wells. Groundwater elevations were measured twice per month at observation wells MW-1 through MW-9. Groundwater elevations were calculated relative to the Chicago City Datum (579.48 feet above mean sea level) at the intersection of State and Madison Streets and are presented in Table 3. The minimum, mean, and maximum groundwater elevations for each well during the year are presented in Figure 2. Overall, groundwater fluctuation in the Upper Des Plaines observation wells remained less than 16 feet during the year, except for wells MW-5, MW-7 and MW-8 where the groundwater fluctuations ranged between 23 feet to 26 feet due to slow recharge after well sampling.

TABLE 2: ANALYSIS OF CHEMICAL AND PHYSICAL PARAMETERS AND FECAL COLIFORM IN GROUNDWATER SAMPLED FROM ANNUAL MONITORING WELLS IN THE UPPER DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN SAMPLED 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								
MW-1	10/31/24	7.7	92	746	<5.0	48	359	0.39	448	15.1	4.9	<1
MW-2	07/02/24	7.5	101	972	<5.0	69	408	0.65	523	14.6	49	<1
MW-3	10/31/24	7.8	91	752	<5.0	23	430	0.36	440	15.4	44	<1
MW-4	09/05/24	7.7	102	888	<5.0	75	354	0.41	522	14.8	4.5	<1
MW-9	09/05/24	7.8	80	682	<5.0	32	317	0.32	332	15.4	14	3

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

TABLE 3: GROUNDWATER ELEVATIONS FOR OBSERVATION WELLS MW-1 THROUGH MW-9 IN THE UPPER DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN MEASURED DURING 2024

Date	Observation Well No.								
	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
	Elevation (feet)[1]								
01/11/24	49	49	45	6	-42	68	50	23	11
01/26/24	50	48	45	6	-40	68	50	24	11
02/07/24	42	39	44	6	**-38**[2]	68	25	**25**	11
02/26/24	42	49	44	5	-52	69	26	25	12
03/08/24	42	49	44	6	-48	69	26	25	11
03/26/24	44	49	45	6	-48	70	26	24	12
04/12/24	42	50	45	5	-47	70	26	25	11
04/24/24	42	49	44	7	-47	69	26	25	11
05/10/24	43	50	45	6	-45	70	26	25	11
05/31/24	41	49	44	6	-45	69	26	25	15
06/21/24	33	49	44	6	-44	66	26	25	11
06/27/24	42	49	44	8	-43	67	26	28	10
07/12/24	42	49	44	6	-37	68	26	44	15
07/26/24	42	49	44	7	**-31**	67	24	**28**	10
08/08/24	41	49	44	6	-47	67	31	21	10
08/23/24	41	49	46	6	-50	67	24	27	12
09/06/24	40	49	43	4	-48	68	25	26	6
09/20/24	41	49	43	8	-54	65	25	24	15
10/04/24	NA[3]	48	43	4	-50	65	34	24	15
10/18/24	40	48	43	5	-47	65	24	24	22
11/01/24	**40**	48	45	6	-51	66	25	24	13
11/14/24	42	49	45	6	-45	67	25	25	15
12/13/24	41	48	44	6	-45	68	24	25	11
12/20/24	41	49	44	6	-45	68	25	25	11

[1]Relative to Chicago City Datum (579.48 feet above mean sea level) at the intersection of State and Madison Streets.
[2]Bold numbers report measurements conducted on a different dates: 1/30/24 and 7/16/24 at wells MW-5 and MW-8, and 10/28/24 at well MW-1 to avoid the effect of well pump down on sampling.
[3]No measurement was reported due to measurement error.

FIGURE 2: MINIMUM, MEAN, AND MAXIMUM WATER ELEVATIONS FOR MONITORING/OBSERVATION WELLS MW-1 THROUGH MW-9 IN THE UPPER DES PLAINES TUNNEL SYSTEM OF THE TUNNEL AND RESERVOIR PLAN MEASURED DURING 2024

