

Information Item

Metropolitan Area Water Supply Advisory Committee



Meeting Date: June 18, 2024

Topic

Local Water Demand Projections – Version 1

District(s), Member(s): All

Policy/Legal Reference: Minnesota Statutes 473.1565

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Division/Department: Environmental Services

Background

This memorandum provides an update of the local water demand projections and the method to project total water demand for the Twin Cities Metropolitan Area. The 2030, 2040, and 2050 projections for every municipal groundwater and surface water system in the Metro Region are attached to this memorandum as Version 1. Projections for the private high capacity wells that are permitted with the DNR and produce more than 10,000 gallons per day on average or more than 1 million gallons per year are currently being prepared by a consultant and should be available by the end of July. The total water demand in the metro region includes demands from municipal water systems (surface water and groundwater systems) and private high-capacity wells that are permitted by the DNR. This work is being done in support of the regional Metro Area Water Supply Plan update. The memorandum describes the use of region-wide water demand projections and details of the proposed approach.

Use of Projections

The Metropolitan Council developed water use projections in support of the update to the regional Metro Area Water Supply Plan. This information will help us to generally understand the magnitude and distribution of future water use in the region. The projections also serve as an input to Metropolitan Council's groundwater modeling efforts and water supply analyses to predict resource constraints and evaluate approaches under future scenarios.

The water demand projections are intended to:

1. Assist Met Council planners and policy makers, state agencies, and community planners to plan for future growth and address regional issues. These projections can help us understand where future water demand might bump up against or exceed capacity, or where there is sufficient capacity to support growth.
2. Provide subregional and regional water demand data for Met Council's groundwater modeling projects, surface water analyses, and other studies.
3. Provide guidance for communities as they develop content for the water supply section of their comprehensive plan to project water utility revenue, plan for water infrastructure improvements, and request DNR appropriation permit amendments as needed to serve growth.

Method Overview

The total metro region's water demand is the sum of the demands from municipal water use (surface water and groundwater systems) and private high capacity well use. The demand projections based on this approach represent a scenario of future water use in the years 2030, 2040, and 2050, and assumes that the water use that occurred between 2013 and 2022 in the metro region is representative of how water will continue to be used in the future. The scenario also ties regional water use planning to the broader regional development framework, *Imagine 2050*, using population forecasts to be adopted for 2030, 2040, and 2050.

The total metro region water demand includes the following basic equation:

Total Metro Region Water Demand = Projected Municipal Water Use + Projected Private High Capacity Well Use (permitted wells)

The projection method for each type of water demand is described as follows:

Projected Municipal Water Use

The method used for projecting municipal water demand uses a total per capita unit use coefficient approach for each of the municipal water utilities in the seven-county metropolitan area. The total per capita unit use coefficient is the total gallons per capita per day water usage (TGPCD) from all water uses in a community including residential, commercial, governmental, and institutional water uses, and unaccounted for water (water leaks, unmetered uses, etc.). This approach calculates a total per capita water use for each community based on the average TGPCD that occurred from 2013-2022 and assumes that the average per capita use will remain constant over the planning horizon of the Metro Area Water Supply Plan. A variable range is applied to reflect uncertainty in demand from year to year.

Future water demand projections for municipal water systems will be obtained by multiplying future water service population projections by the average annual TGPCD water demand that occurred from 2013-2022 with a variable range factor (+/-) to account for variations in the TGPCD that occurred from 2013-2022. Data used in this analysis is from the MN Department of Natural Resources Permitting and Reporting System (MPARS).

The average annual TGPCD demand across the entire metro region for municipal water systems was 100.81 TGPCD from 2013-2022, based on preliminary calculations using MPARS data (see Table 1 and Figure 1 below). It is important to note that 100.81 TGPCD was the *average* water usage that occurred during this timeframe, and it is essential to plan for a variable range of future water demands to account for changes in TGPCD demands that occurred from 2013-2022, additional population and industrial growth beyond growth projections, changes in water efficiency, extreme weather patterns (wet and dry), and other variable conditions that could affect future water demands.

Year	Total GPCD (Total Usage/Service Population)
2013	111.03
2014	103.55
2015	100.34
2016	99.27
2017	98.53
2018	99.22
2019	91.90
2020	97.34
2021	104.36
2022	102.58
Range	91.90-111.03
Average (2013-2022)	100.81
% Above Average	10.13
% Below Average	-8.84

Table 1. Average 2013-2022 total gallons per capita per day across the entire metro region for municipal water systems.

Municipal Total Gallons Per Capita Per Day 2013-2022

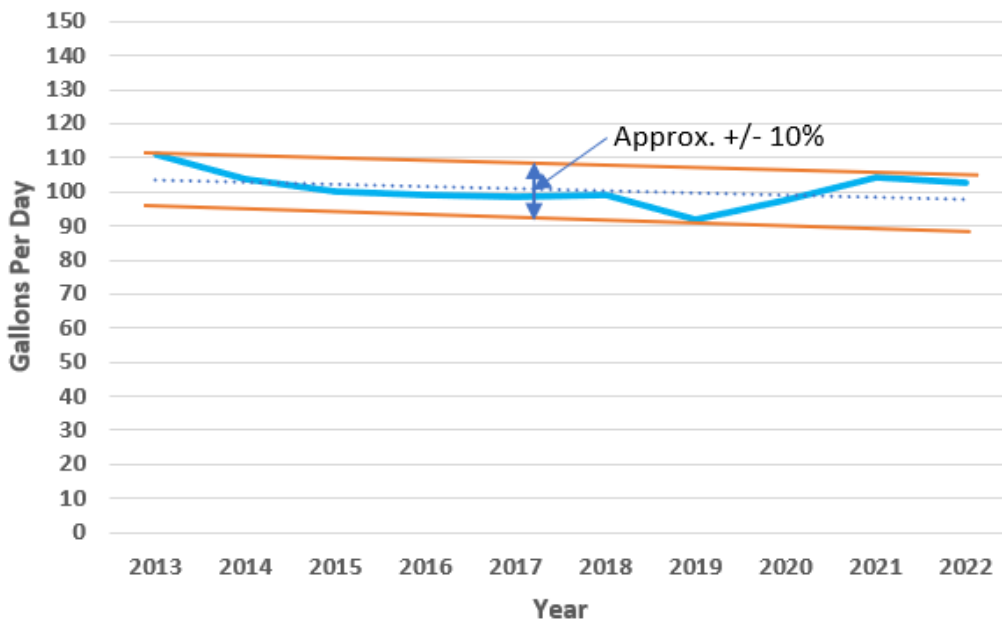


Figure 1. Average annual total gallons per capita per day (TGPCD) across the entire metro region for municipal water systems for the years 2013-2022 (blue line). The average annual TGPCD ranged by approximately +/-10% above and below the trend line (dotted blue line).

The highest annual TGPCD demand, 111.03 GPCD, occurred in 2013. This demand is 10.13% above the average annual TGPCD (100.81) that occurred from 2013-2022 (see Table 1 and

Figure 1 above). Therefore, it is recommended to use 10% for the variable upper range for calculating the **total metro region water demand** as a whole to account for additional population and industrial growth beyond growth projections, changes in water efficiency, extreme weather patterns (wet and dry), and other variable conditions that could affect future water demands. The lowest annual TGPCD demand, 91.90 GPCD, occurred in 2019. This demand is 8.84% below the average annual TGPCD (100.81) that occurred from 2013-2022 (see Table 1 and Figure 1 above). Therefore, it is recommended to also use 10% for the variable lower range for calculating the **total metro region water demand** as a whole to provide consistency (same as upper range). A **minimum variable range of +/-10%** is recommended to project **future annual water demands for the entire metro region** as a whole through 2050. This variable range reflects the historical variable range that occurred from 2013-2022 in the metro region.

Individual communities should consider using a **higher variable range of +/-20% when planning for water system infrastructure improvements and adjusting water utility billing rates** to account for additional population and industrial growth beyond growth projections, changes in water efficiency, extreme weather patterns (wet and dry), and other variable conditions that could affect future water demands. This recommendation is supported by the fact that a number of communities in the metro region experienced water demands that fluctuated greater than +/-10% and closer to +/-20% from 2013-2022. These communities experienced higher variable water demands mainly due to significant changes in their industrial water use and rapid and unforeseen residential growth. The projected municipal water use includes the following equation:

Projected Municipal Water Use = [Projected Water Service Population] X [2013-2022 Average Municipal Total Per Capita Water Use] X 365 Days with a Variable Range (+/-10% for entire metro region water demand as a whole and +/-20% for individual communities)

Projected Private High Capacity Well Use

Water demands from private high-capacity wells that produce more than 10,000 gallons per day or more than one million gallons per year will also be projected for the metro region for 2030, 2040, and 2050. These wells require a permit from the MN Department of Natural Resources, and annual pumping is reported in MPARS. The growth rate for this type of water use will be the average annual growth rate that occurred from the permittee's total private high capacity well use from 2013-2022.

Similar to the assumptions made for the future municipal water demand projections, a variable range of +/-10 to 20% is also recommended to project future water demands from private high-capacity wells in each community. This will provide a reasonable planning approach to account for additional industrial growth beyond growth projections, changes in water efficiency, extreme weather patterns (wet and dry), and other variable conditions that could affect future water demands for private high capacity well owners. The projected private high capacity well use includes the following equation:

Projected Private High Capacity Wells Water Use = [Current Total Annual High Capacity Wells Demand] X [2013-2022 Average Annual Increase Percentage in Demand] with a Variable Range (+/-10% for entire metro region water demand as a whole and +/-20% for individual private high capacity well owners)

Total Metro Region Water Demand

In summary, the Total Metro Region Water Demand was calculated according to the following combined equation that accounts for each type of water use:

Total Metro Region Water Demand =

Projected Municipal Water Use = [Projected Water Service Population] X [2012-2021 Average Municipal Total Per Capita Water Use] X 365 Days with a Variable Range (+/-10% for entire metro region water demand as a whole and +/-20% for individual communities)

+

Projected Private High Capacity Wells Water Use = [Current Total Annual High Capacity Wells Demand] X [2013-2022 Average Annual Increase Percentage in Demand] with a Variable Range (+/-10% for entire metro region water demand as a whole and +/-20% for individual private high capacity well owners)

The Technical Advisory Committee (TAC) advised not including demand projections for low capacity residential private wells that are not permitted by the DNR since this category uses less than 4 percent of the total water use in the metro region and the vast majority of this water is returned to the groundwater from septic drain fields and does not leave the metro region unlike the majority of municipal and industrial water that eventually leaves the metro region via wastewater treatment facilities that discharge to the Mississippi River.

Water Use Data

Data used to support this preliminary analysis were taken from multiple sources to help consider some of the uncertainties related to projecting water demands.

- Population and land use data from Metropolitan Council growth scenarios
- Water use data for annual use was obtained from the Minnesota Department of Natural Resources Permitting and Reporting System (MPARS). The annual use data was taken from data published on the DNR website for each year between 2013 and 2022: http://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/wateruse.html

Historical Population Data

Total population for each community was obtained from interpolated US Census data and projections developed by Met Council's research planners.

In many communities, there is a difference between total population and population served by the public water system. Data on population served by the public water system in each community was obtained from Water Supply Plans submitted to the DNR by each community and from the Minnesota Department of Health's Water Quarry website. The population not served by the water system was calculated as the difference between the reported total population and population served. This unserved population was averaged over the number of years with complete data.

Water Service Population Calculations

Future water service populations for each community that is served by a municipal water system were calculated by adding Met Council's projected population increases for 2030, 2040, and 2050 to the Minnesota Department of Health's 2020 water service population data.

Water Service Population = MDH 2020 Water Service Population + Projected Population Increases from 2020 to 2050

Per Capita Water Use Calculations

Total per capita water use for each community were calculated for each year between 2013 and 2022 by dividing the reported water use by the estimated water service population. The per capita water use was then averaged over this ten-year period. The average per capita water use based on population served is reported in this way for each community.

Total Per Capita Water Use = (Total Municipal Water Use) / (Water Service Population)

This value represents the total municipal water use per capita for each community. This includes all water use in the community, including commercial, governmental, industrial, and institutional uses, and unaccounted for water.



2030, 2040, and 2050 Municipal Water Demand Projections - Version 1

	2013-2022	2030	2030					2040	2040					2050	2050				
	Average Individual Community TGPCD																		
				-10%	+10%	-20%	+20%			-10%	+10%	-20%	+20%			-10%	+10%	-20%	+20%
Andover	127.19	23,711	3.016	2.714	3.317	2.413	3.619	25,091	3.191	2.872	3.510	2.553	3.830	27,287	3.471	3.124	3.818	2.777	4.165
Anoka	123.50	21,732	2.684	2.416	2.952	2.147	3.221	22,146	2.735	2.462	3.009	2.188	3.282	23,422	2.893	2.603	3.182	2.314	3.471
Apple Valley	112.12	56,040	6.283	5.655	6.912	5.027	7.540	58,180	6.523	5.871	7.175	5.219	7.828	60,351	6.767	6.090	7.443	5.413	8.120
Bayport	114.64	2,559	0.293	0.264	0.323	0.235	0.352	2,795	0.320	0.288	0.352	0.256	0.385	3,000	0.344	0.310	0.378	0.275	0.413
Belle Plaine	91.59	8,630	0.790	0.711	0.869	0.632	0.948	10,139	0.929	0.836	1.021	0.743	1.114	14,127	1.294	1.164	1.423	1.035	1.553
Bloomington	103.69	72,247	7.491	6.742	8.240	5.993	8.990	76,420	7.924	7.132	8.716	6.339	9.509	86,358	8.955	8.059	9.850	7.164	10.745
Brooklyn Center	94.46	30,241	2.857	2.571	3.142	2.285	3.428	31,752	2.999	2.699	3.299	2.400	3.599	32,891	3.107	2.796	3.418	2.486	3.728
Brooklyn Park	103.91	84,112	8.740	7.866	9.614	6.992	10.488	87,458	9.088	8.179	9.997	7.270	10.905	91,295	9.486	8.538	10.435	7.589	11.384
Burnsville	141.30	66,605	9.411	8.470	10.353	7.529	11.294	70,310	9.935	8.941	10.928	7.948	11.922	75,200	10.626	9.563	11.688	8.501	12.751
Carver	86.82	5,951	0.517	0.465	0.568	0.413	0.620	7,236	0.628	0.565	0.691	0.503	0.754	11,065	0.961	0.865	1.057	0.769	1.153
Centerville	70.78	4,434	0.314	0.282	0.345	0.251	0.377	4,701	0.333	0.299	0.366	0.266	0.399	5,058	0.358	0.322	0.394	0.286	0.430
Champlin	98.34	24,451	2.405	2.164	2.645	1.924	2.885	25,021	2.461	2.215	2.707	1.968	2.953	24,894	2.448	2.203	2.693	1.958	2.938
Chanhassen	107.44	28,231	3.033	2.730	3.336	2.426	3.640	29,992	3.222	2.900	3.545	2.578	3.867	31,990	3.437	3.093	3.781	2.750	4.124
Chaska	112.47	28,544	3.210	2.889	3.531	2.568	3.852	31,034	3.490	3.141	3.839	2.792	4.188	35,938	4.042	3.638	4.446	3.233	4.850
Circle Pines	80.63	5,140	0.414	0.373	0.456	0.332	0.497	5,429	0.438	0.394	0.482	0.350	0.525	5,700	0.460	0.414	0.506	0.368	0.552
Cologne	77.51	2,231	0.173	0.156	0.190	0.138	0.208	2,702	0.209	0.189	0.230	0.168	0.251	3,432	0.266	0.239	0.293	0.213	0.319
Columbus	100.00	632	0.055	0.050	0.061	0.044	0.066	1,109	0.055	0.050	0.061	0.044	0.066	1,666	0.055	0.050	0.061	0.044	0.066
Coon Rapids	106.60	66,049	7.041	6.336	7.745	5.632	8.449	70,738	7.540	6.786	8.294	6.032	9.048	76,659	8.172	7.354	8.989	6.537	9.806
Cottage Grove	93.91	40,070	3.763	3.387	4.139	3.010	4.515	43,105	4.048	3.643	4.453	3.238	4.857	49,259	4.626	4.163	5.088	3.701	5.551
Dayton	61.15	7,485	0.458	0.412	0.503	0.366	0.549	9,094	0.556	0.500	0.612	0.445	0.667	12,253	0.749	0.674	0.824	0.599	0.899
Eagan	118.21	74,798	8.842	7.958	9.726	7.073	10.610	77,329	9.141	8.227	10.055	7.313	10.969	81,266	9.606	8.646	10.567	7.685	11.528
Eden Prairie	113.13	69,010	7.807	7.027	8.588	6.246	9.369	73,171	8.278	7.450	9.106	6.622	9.934	78,285	8.857	7.971	9.742	7.085	10.628
Edina	119.60	61,853	7.398	6.658	8.138	5.918	8.877	63,474	7.592	6.832	8.351	6.073	9.110	66,302	7.930	7.137	8.723	6.344	9.516
Elko New Market	63.09	5,843	0.369	0.332	0.406	0.295	0.442	8,658	0.546	0.492	0.601	0.437	0.656	11,481	0.724	0.652	0.797	0.580	0.869
Empire Township	99.28	2,691	0.267	0.240	0.294	0.214	0.321	3,271	0.325	0.292	0.357	0.260	0.390	3,860	0.383	0.345	0.422	0.307	0.460
Excelsior	122.88	2,075	0.255	0.229	0.280	0.204	0.306	2,315	0.284	0.256	0.313	0.228	0.341	2,656	0.326	0.294	0.359	0.261	0.392
Farmington	85.19	23,726	2.021	1.819	2.223	1.617	2.425	25,212	2.148	1.933	2.363	1.718	2.577	28,580	2.435	2.191	2.678	1.948	2.922
Forest Lake	111.09	14,497	1.611	1.449	1.772	1.288	1.933	16,792	1.865	1.679	2.052	1.492	2.239	20,266	2.251	2.026	2.477	1.801	2.702
Fridley	94.21	29,661	2.794	2.515	3.074	2.236	3.353	30,731	2.895	2.606	3.185	2.316	3.474	32,376	3.050	2.745	3.355	2.440	3.660
Greenfield	121.04	668	0.081	0.073	0.089	0.065	0.097	954	0.115	0.104	0.127	0.092	0.139	1,286	0.156	0.140	0.171	0.125	0.187
Hamburg	58.44	587	0.034	0.031	0.038	0.027	0.041	605	0.035	0.032	0.039	0.028	0.042	613	0.036	0.032	0.039	0.029	0.043
Hampton	66.06	706	0.047	0.042	0.051	0.037	0.056	745	0.049	0.044	0.054	0.039	0.059	783	0.052	0.047	0.057	0.041	0.062
Hastings	102.93	25,905	2.666	2.400	2.933	2.133	3.200	26,985	2.778	2.500	3.055	2.222	3.333	28,280	2.911	2.620	3.202	2.329	3.493
Hopkins	108.23	21,442	2.321	2.089	2.553	1.857	2.785	23,567	2.551	2.296	2.806	2.041	3.061	25,477	2.757	2.482	3.033	2.206	3.309
Hugo	84.72	14,764	1.251	1.126	1.376	1.001	1.501	16,893	1.431	1.288	1.574	1.145	1.717	20,547	1.741	1.567	1.915	1.393	2.089
Inver Grove Heights	79.74	39,620	3.159	2.843	3.475	2.527	3.791	42,352	3.377	3.039	3.715	2.702	4.052	45,765	3.649	3.284	4.014	2.919	4.379
Jordan	86.84	6,824	0.593	0.533	0.652	0.474	0.711	7,461	0.648	0.583	0.713	0.518	0.777	8,227	0.714	0.643	0.786	0.572	0.857
Lake Elmo	98.70	10,296	1.016	0.915	1.118	0.813	1.219	12,007	1.185	1.067	1.304	0.948	1.422	14,527	1.434	1.290	1.577	1.147	1.721
Lakeland	65.29	3,257	0.213	0.191	0.234	0.170	0.255	3,511	0.229	0.206	0.252	0.183	0.275	3,489	0.228	0.205	0.251	0.182	0.273
Lakeville	102.59	69,909	7.172	6.455	7.889	5.738	8.607	74,062	7.598	6.838	8.358	6.079	9.118	84,015	8.619	7.757	9.481	6.895	10.343
Lexington	88.99	2,551	0.227	0.204	0.250	0.182	0.272	2,642	0.235	0.212	0.259	0.188	0.282	2,702	0.240	0.216	0.264	0.192	0.289
Lino Lakes	87.00	21,043	1.831	1.648	2.014	1.465	2.197	23,146	2.014	1.812	2.215	1.611	2.416	26,474	2.303	2.073	2.533	1.843	2.764
Long Lake	103.62	1,900	0.197	0.177	0.217	0.157	0.236	2,033	0.211	0.190	0.232	0.169	0.253	2,103	0.218	0.196	0.240	0.174	0.261
Loretto	81.24	728	0.059	0.053	0.065	0.047	0.071	746	0.061	0.055	0.067	0.048	0.073	770	0.063	0.056	0.069	0.050	0.075
Mahtomedi	83.44	7,282	0.608	0.547	0.668	0.486	0.729	7,840	0.654	0.589	0.720	0.523	0.785	7,770	0.648	0.583	0.713	0.519	0.778
Maple Grove	114.38	85,679	9.800	8.820	10.780	7.840	11.760	93,066	10.645	9.580	11.709	8.516	12.774	103,428	11.830	10.647	13.013	9.464	14.196

White Bear Township	98.72	11,271	1.113	1.001	1.224	0.890	1.335	12,123	1.197	1.077	1.316	0.957	1.436	12,175	1.202	1.082	1.322	0.962	1.442
Woodbury	101.56	77,462	7.867	7.081	8.654	6.294	9.441	82,050	8.333	7.500	9.167	6.667	10.000	88,885	9.028	8.125	9.930	7.222	10.833
Total		3,115,626	314.092	282.683	345.501			3,314,365	333.967	300.570	367.364			3,563,556	359.160	323.244	395.076		