



Updated Approach

2050 Water Demand Projections



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metro council.org

Original Proposed Approach: Projection of 2050 Municipal Water Demand

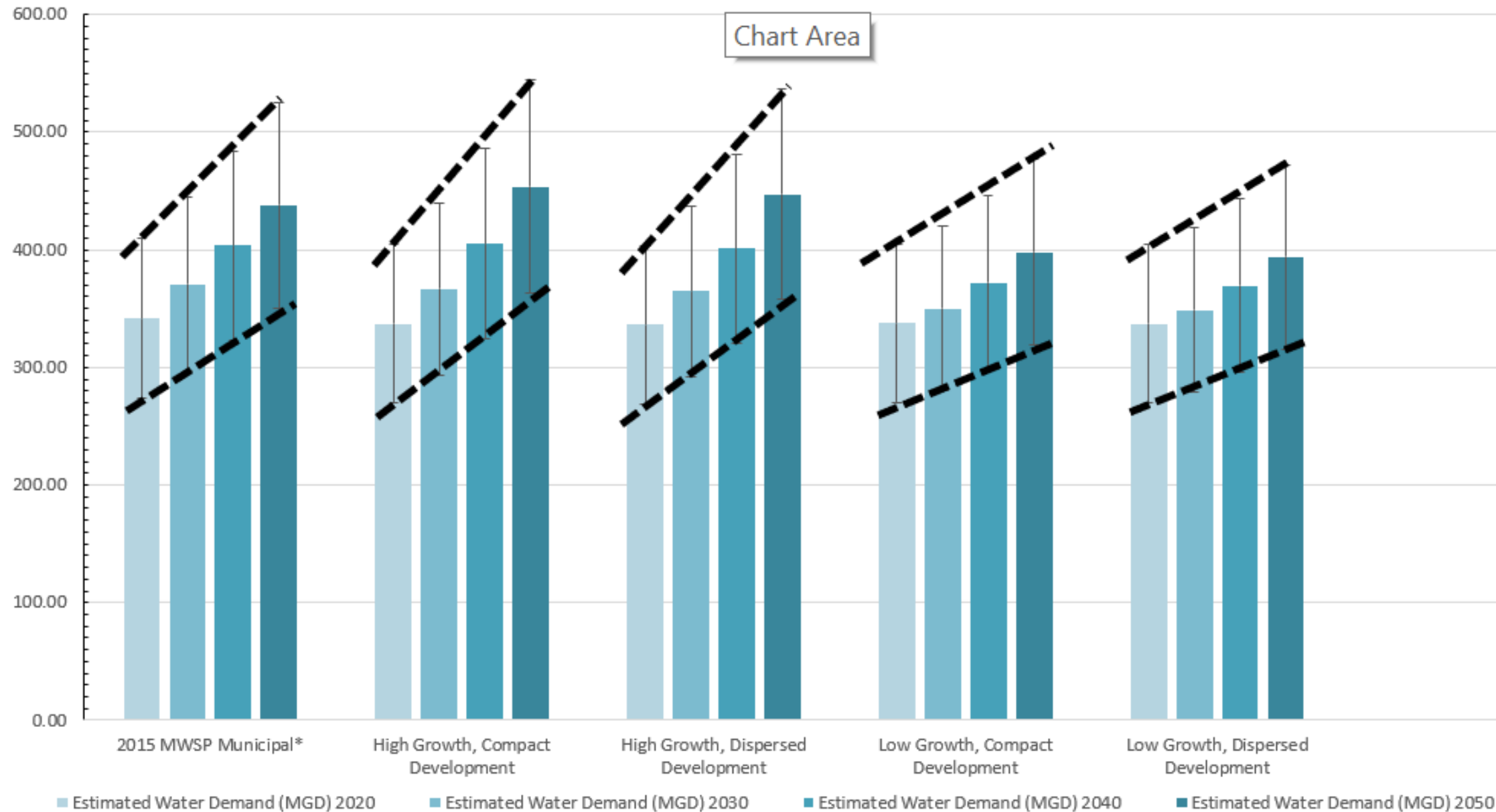
Use the average historical water use per capita demand and Met Council's population forecasts, including exploration of uncertainty with four different development scenarios, to represent a range of possible future (2050) water use as follows:

**Projected Municipal Water Use = [Projected Population by Regional Growth Planning Scenario*]
x [Per Capita Water Use] with a Variable Range (+/- 20%)**

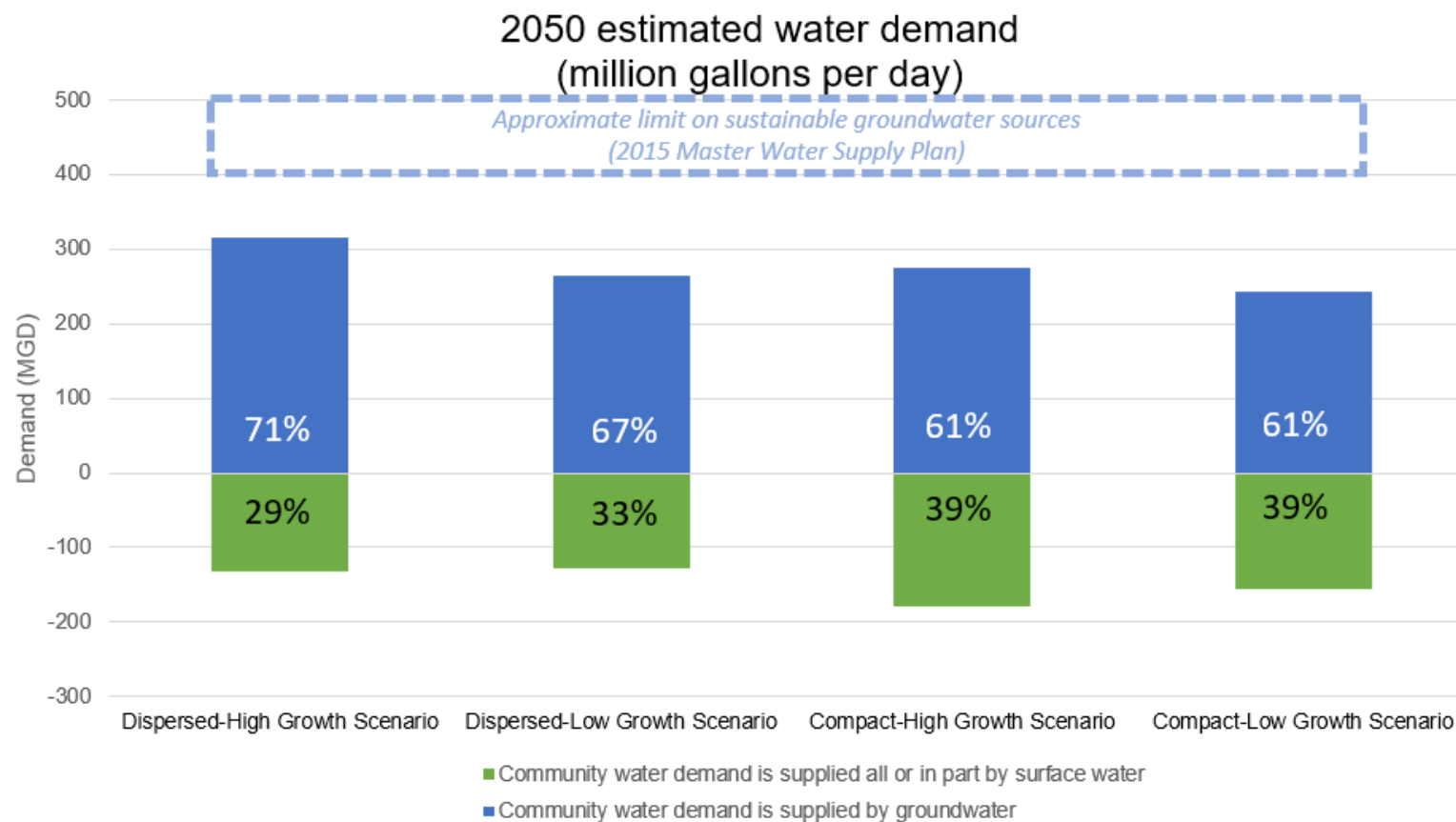
The four development scenarios include:

- 1. High growth with compact development**
- 2. High growth with dispersed development**
- 3. Low growth with compact development**
- 4. Low growth with dispersed development**

Preliminary Results of Original Proposed Approach vs. 2015 MWSP Demand



Preliminary Results of Original Proposed Approach: Water Demand by Source



Dispersed growth scenarios:

- More groundwater than surface water use, bringing us closer to limits of groundwater sustainably
- More pressure to provide water through additional private wells in areas not served by municipal systems

Compact growth scenarios:

- Increased use of existing surface water systems (Mississippi River), which currently has higher monitoring requirements, treatment, and costs.
- Higher risk of impact from sudden drought.

High growth versus low growth scenarios:

- More pressure to expand or create new public and private water supply systems

Updated Approach: Projection of 2050 Total Water Demand

Total Metro Region Water Demand =
Projected Municipal Water Use +
Projected Private High Capacity Well Use +
Projected Private Residential Well Use

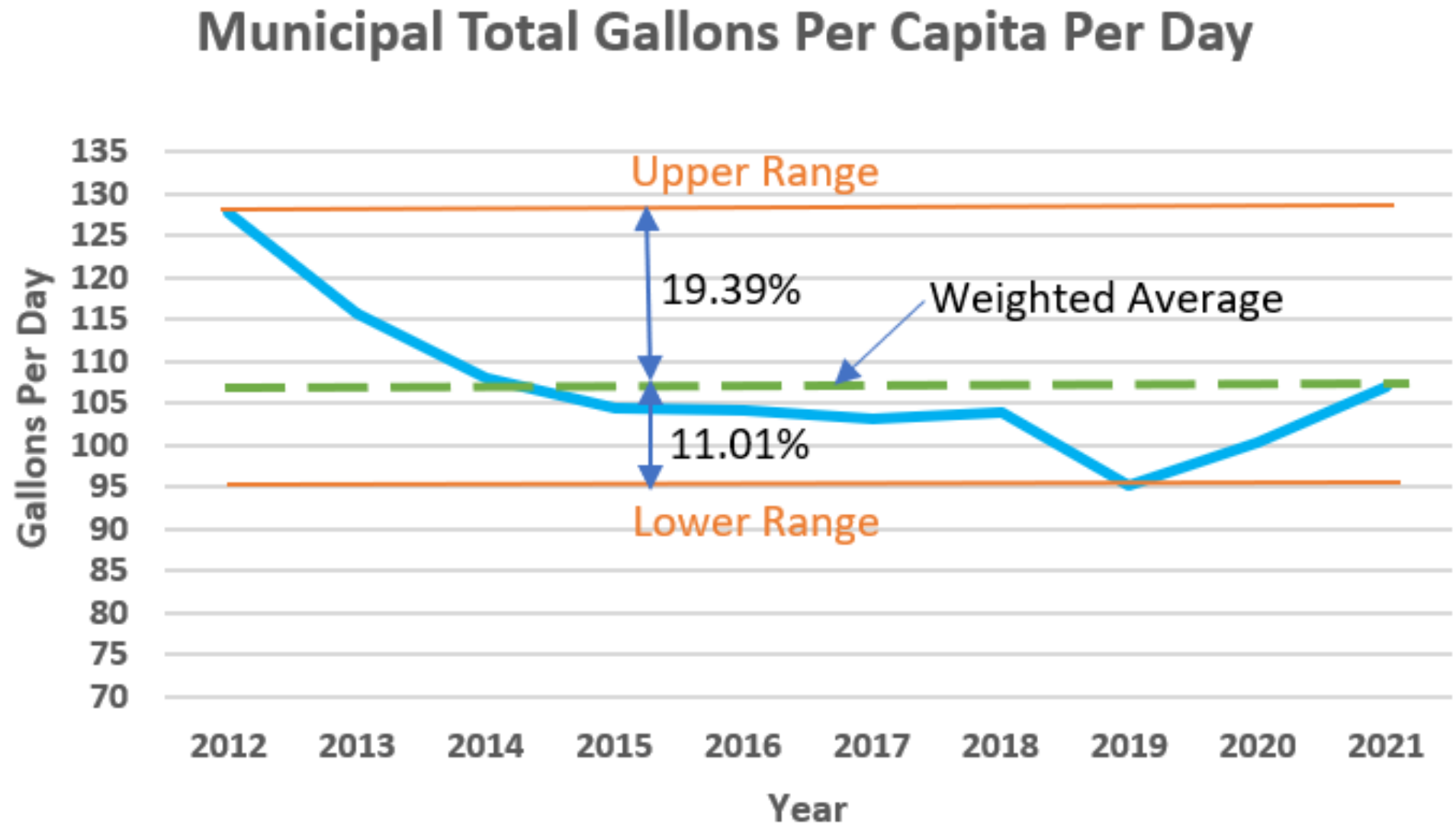
Updated Approach: Projection of 2050 Municipal Water Demand

Use Met Council's population forecast for each community, the average per capita demand from 2012-2021 for each community, and a variable range to represent a range of possible future water use as follows:

**Projected Municipal Water Use = [Projected Water Service Population]
x [2012-2021 Average Total Per Capita Water Use] with a Variable Range (+/- 20%)**

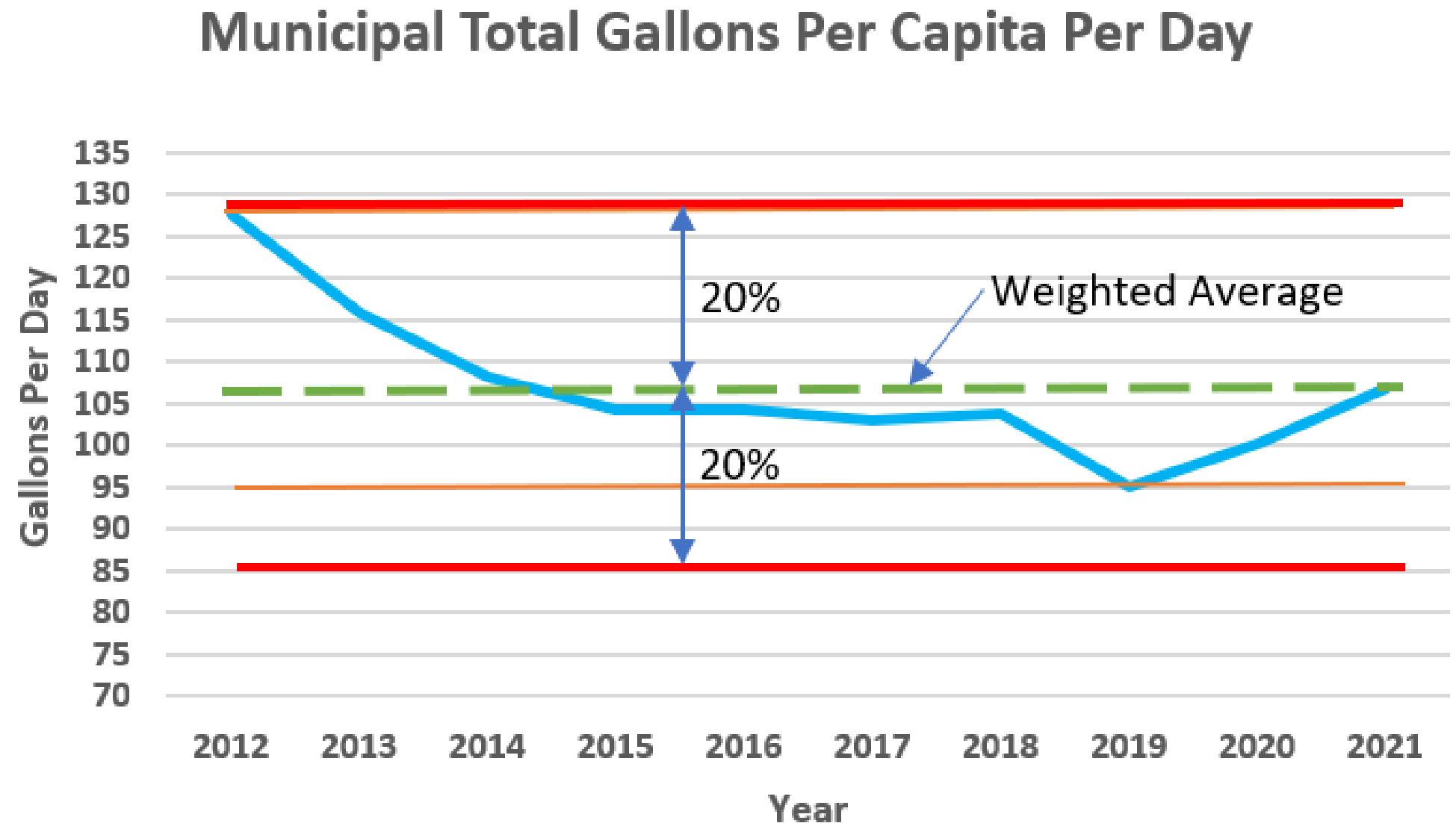
Variable Range Analysis

Year	Total GPCD (Total Usage/Service Population)
2012	127.65
2013	115.72
2014	108.04
2015	104.35
2016	104.17
2017	103.13
2018	103.83
2019	95.14
2020	100.26
2021	106.92
Range	95.14-127.65
Average (2012-2021)	106.92
% Above Average	19.39
% Below Average	-11.01



Recommended Variable Range

Year	Total GPCD (Total Usage/Service Population)
2012	127.65
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Average (2012-2021)	106.92
% Above Average	19.39
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Updated Approach: Projection of 2050 Private High Capacity Wells Water Demand

Use the community's current total annual high capacity wells demand from MPARS data, the average annual increase in demand from 2012-2021 as a percentage, and a variable range to represent a range of possible future water use as follows:

Projected High Capacity Wells Water Use = [Current Total Annual High Capacity Wells Demand] X [2012-2021 Average Annual Increase Percentage in Demand] with a Variable Range (+/- 20%)

Updated Approach: Projection of 2050 Private Residential Wells Water Demand

Use Met Council's population forecast for each community, the average per capita demand from 2012-2021 for each community, and a variable range to represent a range of possible future water use as follows:

**Projected Municipal Water Use = [Total Population - Water Service Population]
x [55 GPCD] with a Variable Range (+/- 20%)**

Updated Approach: Projection of 2050 Total Metro Region Water Demand

Total Metro Region Water Demand =

$$\begin{aligned} & \text{Projected Municipal Water Use} = [\text{Projected Water Service Population}] \\ & \times [\text{2012-2021 Average Municipal Total Per Capita Water Use}] \times 365 \text{ Days with a Variable Range} \\ & \quad (+/- 20\%) \\ & \quad + \\ & \text{Projected Private High Capacity Wells Water Use} = [\text{Current Total Annual High Capacity Wells} \\ & \text{Demand}] \times [\text{2012-2021 Average Annual Increase in Demand Percentage}] \text{ with a Variable Range} \\ & \quad (+/- 20\%) \\ & \quad + \\ & \text{Projected Private Residential Wells Water Use} = [\text{Total Population} - \text{Water Service Population}] \\ & \quad \times [55 \text{ GPCD}] \times 365 \text{ Days with a Variable Range (+/- 20\%)} \end{aligned}$$

Example Community Water Demand Projection (1 of 6)

Lady Slipper, Minnesota

2023 Populations – 15,353 total population and 12,525 water service population

2050 Projected Populations – 24,800 total population and 20,960 water service population

2012-2021 Average Municipal Total Per Capita Water Use – 97 GPCD

Firm Well Capacity – 2,000 gallons per minute (gpm)

Community DNR Groundwater Appropriation Permit Limit – 575 million gallons per year (MGY)

2012-2021 Average Maximum Day/Average Day Peak Multiplier – 2.20

Current Private High Capacity Well Use – 109 MGY

2012-2021 Average Private High Capacity Well Use Annual Growth Rate – 1.6%

Example Community Water Demand Projection (2 of 6)

2050 Total Water Demand =

Projected Municipal Water Use = [20,960 people]
x [97 GPCD] X 365 Days with a Variable Range (+/- 20%)

+

Projected High Capacity Wells Water Use = [109 MGY] X [1.6% per year growth rate] X
[27 years] with a Variable Range (+/- 20%)

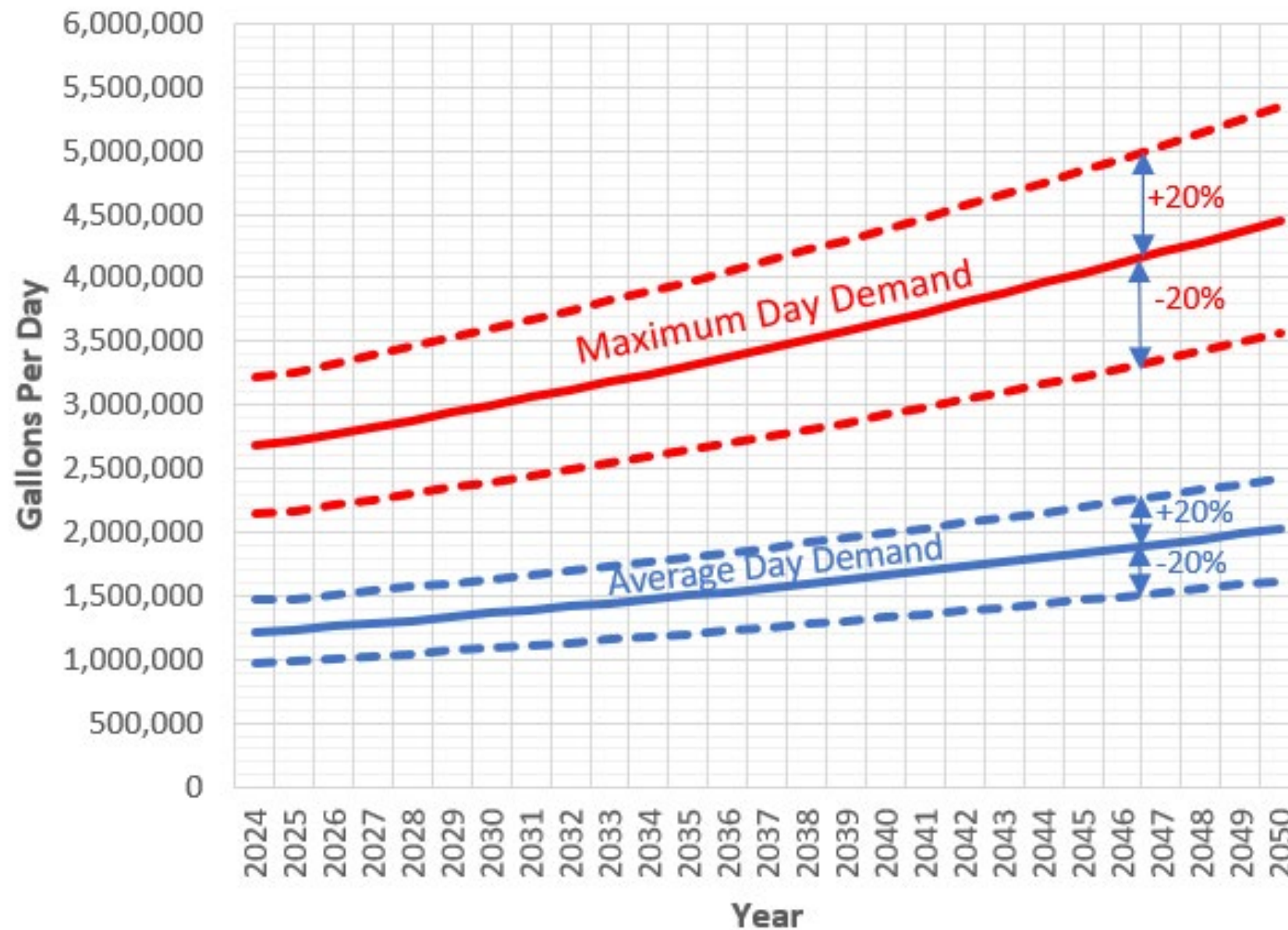
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Projected Private Residential Water Use = [24,800-20,960 people]
x [55 GPCD] X 365 Days with a Variable Range (+/- 20%)

= 986.5 MGY +/- 197.3 MGY

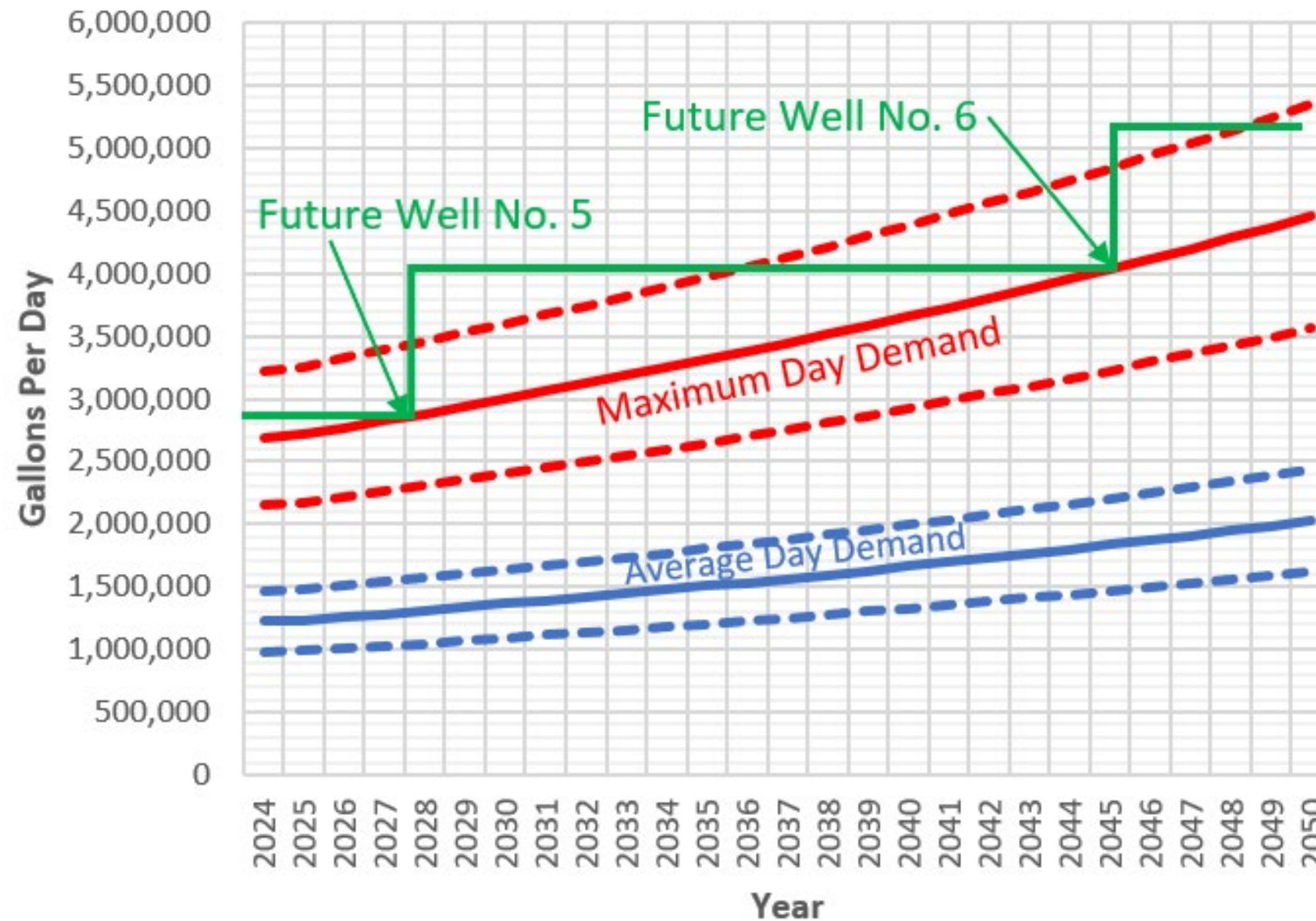
Example Community Water Demand Projection (3 of 6)

Projected Average and Maximum Day Demand



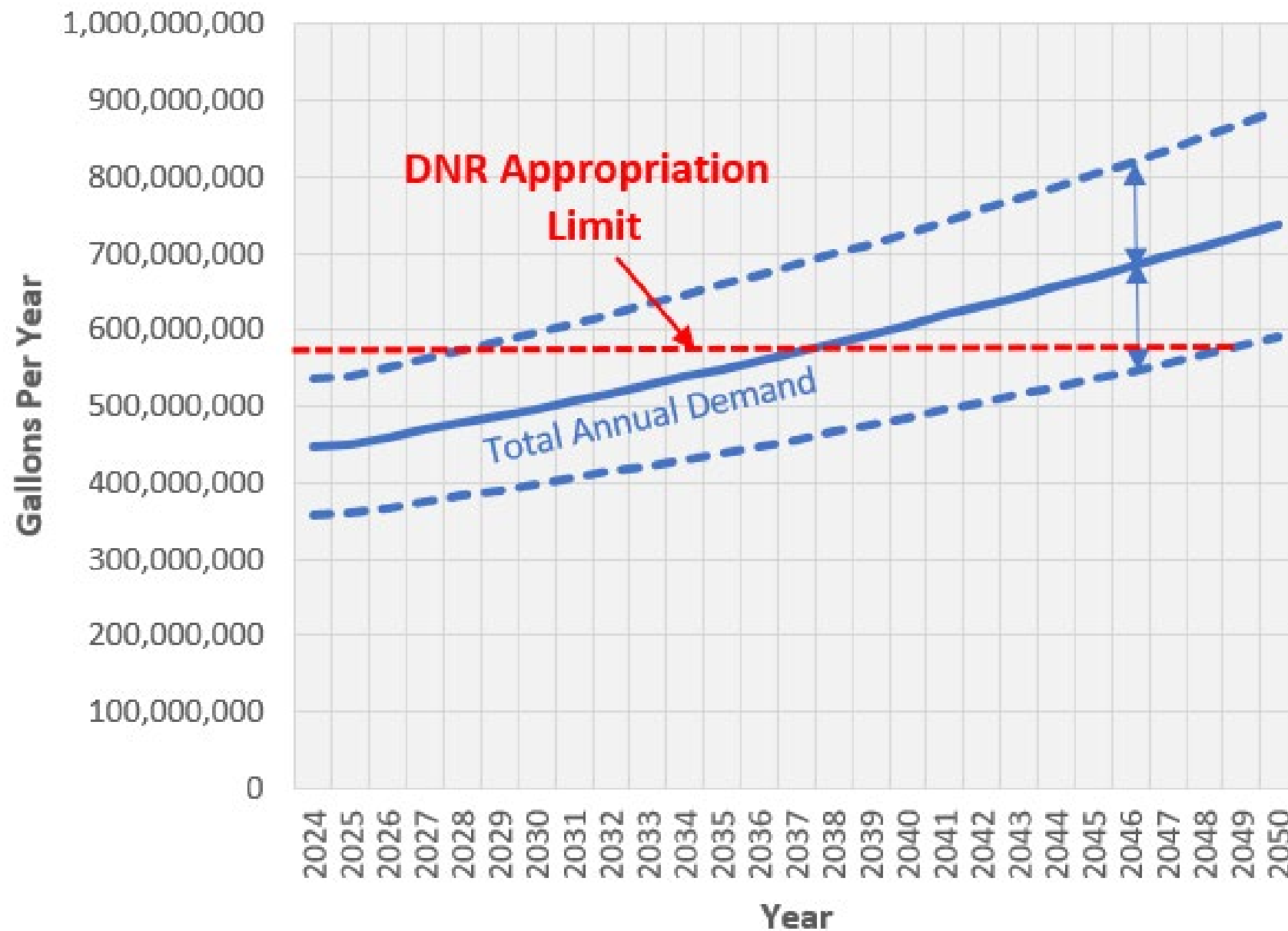
Example Community Water Demand Projection (4 of 6)

Projected Average and Maximum Day Demand



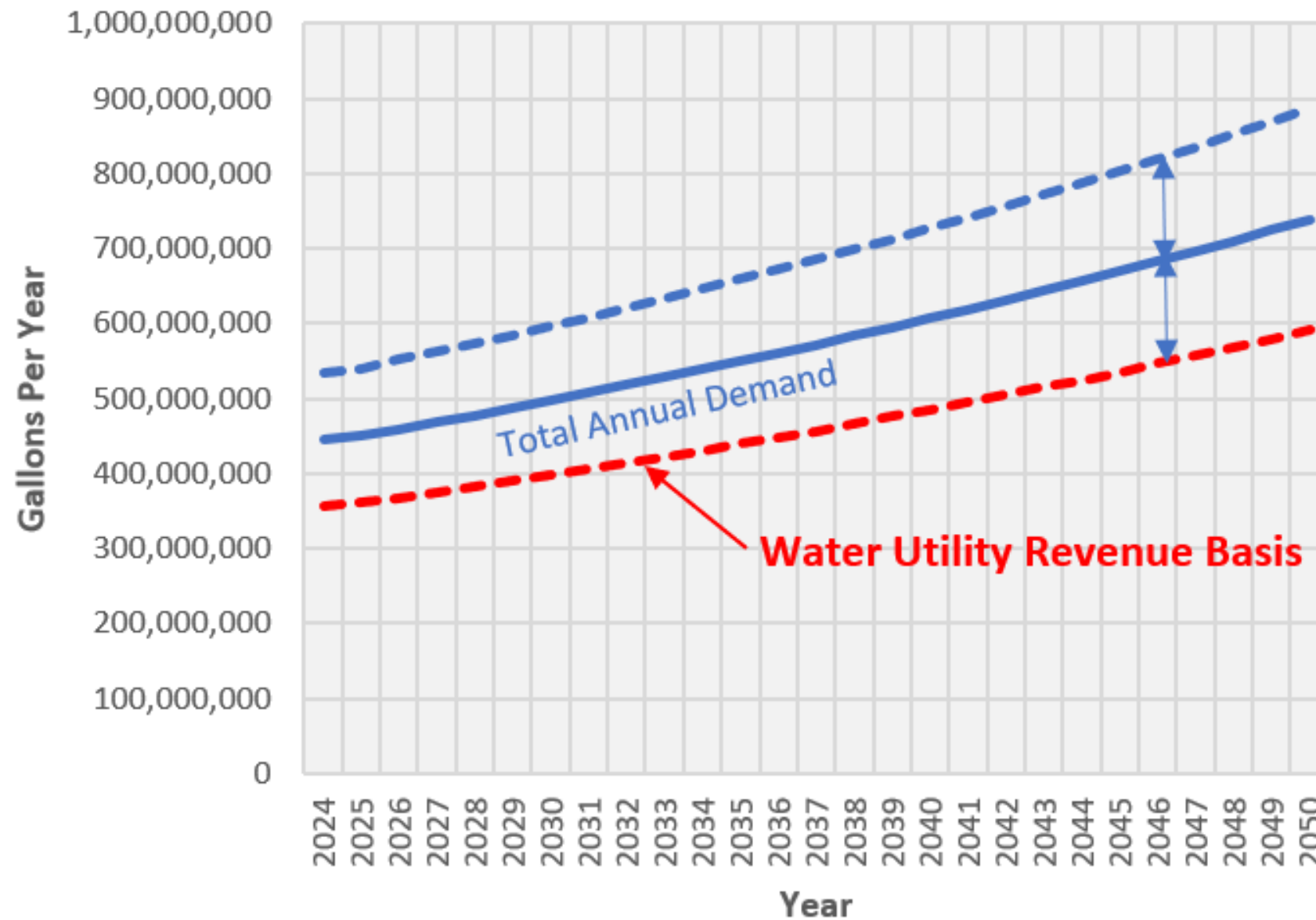
Example Community Water Demand Projection (5 of 6)

Projected Total Annual Demand



Example Community Water Demand Projection (6 of 6)

Projected Total Annual Demand



Questions for TAC

1. What do you think of the updated approach to projecting water demands through 2050?
2. Do you see a benefit to calculating water demand projections for the four different development scenarios in addition the one projection with Met Council's regional population forecast?

Next Steps



- Work with the DNR to fill-in the missing data gaps from MPARS. Request missing data from communities for remaining data that the DNR cannot provide.
- Communicate water demand projection method at the subregional workshop on February 29th, 2024.
- Obtain final 2050 population projections from Met Council's Research staff.
- Calculate and develop water demand projections to year 2050.
- Complete other water demand analyses (ex. compare to wastewater flows, analyze water demands by individual wastewater sewershed areas, analyze employment demand projections, etc.)