

WATER

2018 amendments to the Virginia Code now require Comprehensive Plans to survey and study water availability, quality, and sustainability. § 15.2-2224.

Warrenton is served by two adjoining reservoirs and 3 wells resulting in a "safe yield" of 2.346 million gallons per day (MGD) of water. Reactivation of a fourth well may add 0.075 MGD. Growth targets for *Plan Warrenton 2040* would have the Town using 91% of its daily safe yield of water on average, but peak day demand is predicted to need 36% more water (875,570 gallons) than safe yield would supply.

WHAT ARE THE CONCERNS ABOUT WATER?

Relying on a system that would repeatedly need to provide water in excess of safe yield, with no analysis of the effect on storage levels, coupled with an assumption that all wells would be fully operational at all times does not ensure daily water availability or sustainability.

1) Do We Have Enough Water for Normal Peak Day Usage for the 20 year Planning Period?

The Comp Plan is silent on how Warrenton's water needs will be met on peak days. CFFC created this graph using data from the Comp Plan to show the water supply gap.¹

- How many days a year would demand exceed safe yield?
- How many gallons more than the daily safe yield would we need for each of these days?
- How many days in a row can we depend on storage to meet our water needs when demand exceeds safe yield?
- Are fire flows included?
- Where would the necessary water come from? Would the dam need to be raised?



¹ Maximum Day Demand is the highest water demand of the year during any 24-hour period. Average Day Demand is the total annual quantity of water demand divided by 365.

- The consultant's report states, "...the Town will need to initiate Well #4 by 2032 to meet maximum daily demand." That statement implies that Well #4 is all that is needed to close the gap between maximum and average day water demand. It is not. Well #4 would supply only 75,000 gpd. The gap between average and max day demand by the end of the planning period is 950,569 gpd. Do we have enough storage to meet that gap in peak water use months?

Gap in Water Utility Requirements		
Total Demand (Average)	2,198,158	gpd
Peak Factor	1.5	
Max. Daily Demand	3,297,236	gpd
Existing Water Treatment Plant Capacity	3.4	MGD
Additional Treatment Capacity Required (2040)	-	MGD
Total Available Water (Conservative Estimate) <i>Safe Yield</i>	2,346,667	gpd

Warrenton Comp Plan Hyperlink A.2 Water & Wastewater, p. 6.

2) Peak Monthly Water Demands Need to be Assessed

The Virginia Administrative Code requires water plans to express demand on a peak monthly basis (9 VAC 25-780-100). *Plan Warrenton 2040* does not forecast peak monthly demands.

3) System Reliability Is Questionable

Text book best practices for environmental engineers² stipulate that the safe yield should factor in system reliability safeguards to ensure functional and sustainable water supply:

Reserves Factored into the Safe Yield

Water Source	Recommended Safeguards	Plan Warrenton 2040	
Surface Water (Reservoirs)	A drought reserve equal to a 50-year drought, or the most extreme drought of record	✓	0.30 MGD drought reserve equal to at least the 70-year drought event of 1998
Ground Water (Wells)	Enough water for Maximum Day Demand with the largest well out of service	✗	Calculations are based on Average Daily instead of Maximum Day Demand
		✗	No reserve. Assumes no substantial operational problems at any well.

The Town's own 2010 Water Supply report highlights that, "the available supply and demand projections have a very small contingency or safety factor." Why has this not been addressed in the Plan?

² *Water and Wastewater Engineering, Design Principles and Practice*, Mackenzie L. Davis, McGraw Hill, 2010.

4) Will We Trigger our Drought Plan More Often?

Warrenton's Drought Plan is triggered when storage reserves are reduced to 150 days. Warrenton has invoked its Drought Plan several times in the past. The Drought Plan was triggered in 2007--a year when Warrenton had a large 32% cushion between its Average Daily Demand (ADD) for water and Safe Yield. Water demand for *Plan Warrenton 2040* would shrink the cushion between ADD and Safe Yield to only 9%.

Since the town is allowing mixed use development without rezoning, there are no guard rails on the actual growth rate. Warrenton's growth and water demand could easily be greater than the numbers assumed in the analysis. Other communities are subjected to routine water restrictions because of poor planning. Is this Warrenton's future?

5) Omission of Certain Projects from Water Demand Projections

The consultants projected in-town water demand from 3 categories of development: uses already in place (using actual flow data from 2014-2018); site plans approved as of 2015; and new growth from *Plan Warrenton 2040* which includes 310,000 sq ft new commercial and 2,102 new residential units.

The Walker Drive PUD, for one, appears to be omitted from this analysis. The town has stated that the PUD is not included in the new *Plan Warrenton 2040* growth targets since it is an already approved project. The site plan for the PUD was not approved as of 2015. Therefore, it does not fit any of the categories the consultants used to estimate future demand. How does this omission affect the analysis, and are other projects omitted?

WE RECOMMEND THE FOLLOWING TO ENSURE SUSTAINABLE WATER SUPPLY:

1. Reassess Safe Yield
 - Institute system reliability recommendations for safe yield from wells.
2. Reassess Future Demand
 - Complete an inventory of Town lots with site plans approved since 2015. Identify and include water demand projected for lots omitted from the Plan's analysis.
 - Assess and evaluate peak monthly demands and compare them to the 80% State planning threshold for waterworks.
 - Determine whether consecutive peak daily levels could result in a draw-down of the reservoir to the level that triggers voluntary water restrictions (150 days of storage).
3. Put Forth a Transparent Plan
 - Identify how much storage is needed so water restrictions will not be necessary under dry month weather conditions.

- Be clear if raising the dam and/or adding more water storage is necessary to meet peak day water demands for the growth targets. Share those costs of the plan with the public.
- Be clear if water demand from the growth targets could invoke Virginia's 80% planning trigger for waterworks, and share those costs with the public.

4. Ensure that Water Demand will not Outpace Supply

- Adjust growth targets to ensure that water restrictions will not be necessary under normal dry month weather conditions, OR ALTERNATIVELY
- Create New Zoning Districts for the Mixed Use Growth and implement this new development through a rezoning process.
- Evaluate the need and expense for additional water storage over the life of the plan.