Stantec

Memo

To:	Justin DeMarco Department of Public Works Maynard, MA	From:	Katie Chamberlain Stantec Consulting Services Inc. Burlington, MA
File:	195110237	Date:	January 7, 2020

Reference: Maynard Water Capacity Questions - REVISED

The intent of this memo is to provide additional information related to the Town's drinking water supply capacity, water demands, and how development may impact the drinking water system. This memo is responding to concerns the Town's planning board has expressed regarding their role in allowing development within the community and its impacts to the Town's utility infrastructure and rate structures.

DEVELOPMENT IN THE NEAR FUTURE

The Town of Maynard is experiencing an increase in housing developments and continued development is anticipated over the next decade. The major housing developments that are either currently under construction or in planning phases are summarized in the "White Pond Treatment and Transmission Study Report" (Section 3.2). Since the issuance of the White Pond Report two important developments have been further defined that may have significant impacts on the Town's future water demands:

1. Beijing Royal School (BRS) and
2. Mill & Main Place

BEIJING ROYAL SCHOOL

In May 2019, BRS purchased 111 Powder Mill Road, the former Stratus Technologies campus, with plans to create a campus for its students in kindergarten through grade 12 on the site. The BRS vision also includes hosting of joint educational conferences, hosting a day care center, and leasing space at the school for research and development. BRS is hoping that the Maynard, MA branch of the school can open its doors in the Fall of 2020. The school will initially plan to open its doors to approximately 100 students, but at full build out hopes to host about 800 students. Dormitories will be provided for a large portion of the student body and school personnel.

Per 310 CMR 15.00: Septic Systems "Title 5", the average sewer flow is 65 gallons per day (GPD) per person for boarding schools. Water usage can be calculated from estimated sewer flows based off the assumption that 90% of water used ultimately ends up as sewage. For conservative water demand estimates, a boarding school population of 1,000 has been assumed. The estimated sewer production will be 65,000 GPD for 1000 people, and the corresponding average water demand will be 72,222 GPD or 0.072 million gallons per day (MGD).

MILL & MAIN PLACE

The Mill & Main Place development is a project being undertaken by Lincoln Property Company at the mill complex. The Mill is currently partially occupied as a mixed-use property, but it is zoned to allow for up to 500 residential units, which is a significantly different use than current with regards to water use impacts. In order to understand the impacts this sort of development may have on the Town's ability to provide drinking water, an estimate of potential maximum future water use demands was performed. Water demands for future Mill development were estimated assuming:

Reference: **Maynard Water Capacity Questions - REVISED**

- 310 CMR 15.00: Septic Systems "Title 5" sewer flows associated with 1-bedroom residential units
- 90% of water used ultimately ends up as sewage
- 100% of the 500 residential units would be 1-bedroom apartments

Based on these assumptions, the estimated average water usage at the Mill, with 500 residential units, will be 0.06 MGD.

TOWN-WIDE WATER DEMANDS – CURRENT & FUTURE

Detailed documentation of the Town's historical, current, and estimated future annual water consumption is provided in the "White Pond Treatment and Transmission Study Report" (Section 3.0). ***In 2018, the average day demand was 0.685 MGD and the maximum day demand was 1.041 MGD.*** The future water demands presented in the "White Pond Treatment and Transmission Study Report" need to be updated based on the new information regarding potential BRS and Mill & Main developments.

The water demand resulting from the BRS and Mill & Place developments are added to the residential water demand estimated in the "White Pond Treatment and Transmission Study Report", resulting in new ***future water demand estimates: an average day water demand of 0.99 MGD and a maximum day demand of 1.58 MGD***. These estimates include an additional 5% of water demands to account for unknown future development in Town.

Water demand is expected to decrease over the period from 2020 to 2045 as efforts are undertaken by the Town to meet the unaccounted for water (UAW) performance standard of 10% established by Massachusetts under the Water Management Act. Future planning for water supply projects should use the future demand estimates that represent the highest values to ensure all water demands can be met in all years. The highest demands are estimated in years 2020 through 2023, after which demands slightly decrease due to an assumed decrease in unaccounted for water. The average day demand of 0.99 MGD and maximum day demand of 1.58 MGD represent the highest estimated demands over the 25-year planning period.

CURRENT WATER SUPPLY CAPACITY

Detailed documentation of the Town's water sources, and capacity of each source, is provided in the "White Pond Treatment and Transmission Study Report" (Section 2.0). Figure 1 shows the current capacity of each of the sources based on recent historical operational data (2017-2019). This figure also shows the average and maximum day water demands for the current and future scenario with BRS and Mill & Main development demands included.

There are three key takeaways from Figure 1:

1. The Town can meet average day demands currently, unless the largest WTP (Rockland Ave) is offline. Under the estimated future demands scenario, the Town is not able to meet average day demands if the largest WTP or the largest single well source is offline.
2. The Town may be unable to meet current maximum demands if the largest water treatment plant (WTP) or largest well source is offline. The Town will need to rely on the water storage tanks and increase pumping capacity of one or more wells in order to meet maximum demands under the current operational scenario. Although this is a feasible short-term solution, it is not advisable to take

this approach in the long term due to the stress that this sort of operations can put on the Town's existing wells and WTPs.

3. The Town is unable to meet future maximum day demands with current water supplies. Additional sources need to be explored to meet future demands if development is to continue in Town.

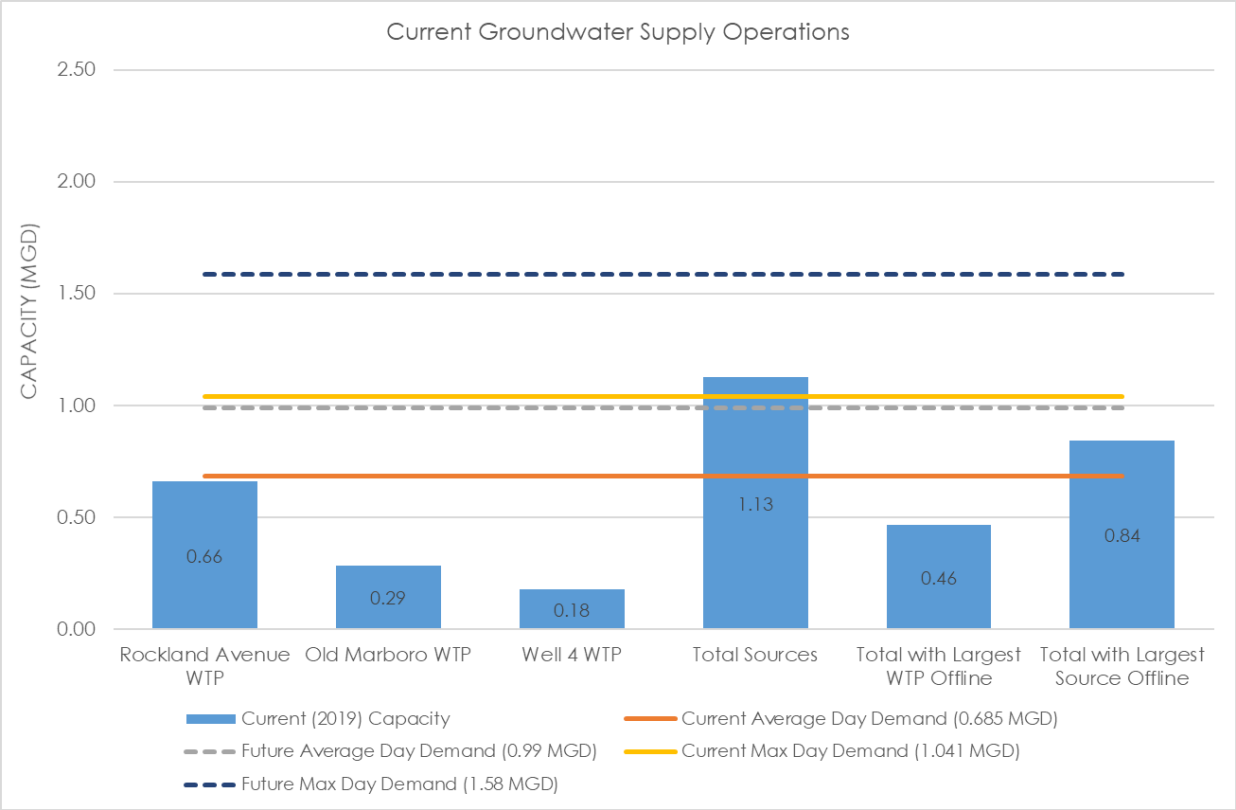

Figure 1 – Current Drinking Water Supply Capacity

OPTIONS TO MEET FUTURE WATER DEMANDS

Detailed documentation of the Town's options to increase water system capacity by exploring new sources and improving existing sources is provided in the "White Pond Treatment and Transmission Study Report" (Section 4.0). Figure 2 shows the estimated future capacity of each of the Town's existing WTPs, based on making the following improvements to the existing well fields:

- New well sources at the Well 4A field are permitted and brought online (0.35 MGD). The permitting process is underway now, it is anticipated that these wells can be online by Fall 2021.
- New well source (Well #1) at Rockland Ave well field (0.22 MGD); this option has only been conceptually considered at this time. If this project is pursued immediately, it is anticipated that permitting, design and construction could be finished by Fall 2022.
- Bring Old Marlboro Road Well #3 back online and implement major treatment improvements at Old Marlboro Road WTP to adequately treat the Well #3 water (i.e. organics pretreatment), allowing an

Reference: **Maynard Water Capacity Questions - REVISED**

additional 0.5 MGD of capacity. If this project is pursued immediately, it is anticipated that permitting, design and construction could be finished by Summer 2023.

Figure 2 also show the average and maximum day water demands for the current and future scenario with BRS and Mill & Main development demands included. The Town can significantly increase their ability to meet future water demands by implementing these well field source improvements. The only shortcoming is with regards to capacity if the largest water treatment facility were to go offline; in this case the Town would be able to meet average day demands but would not be able to meet future maximum day water demands.

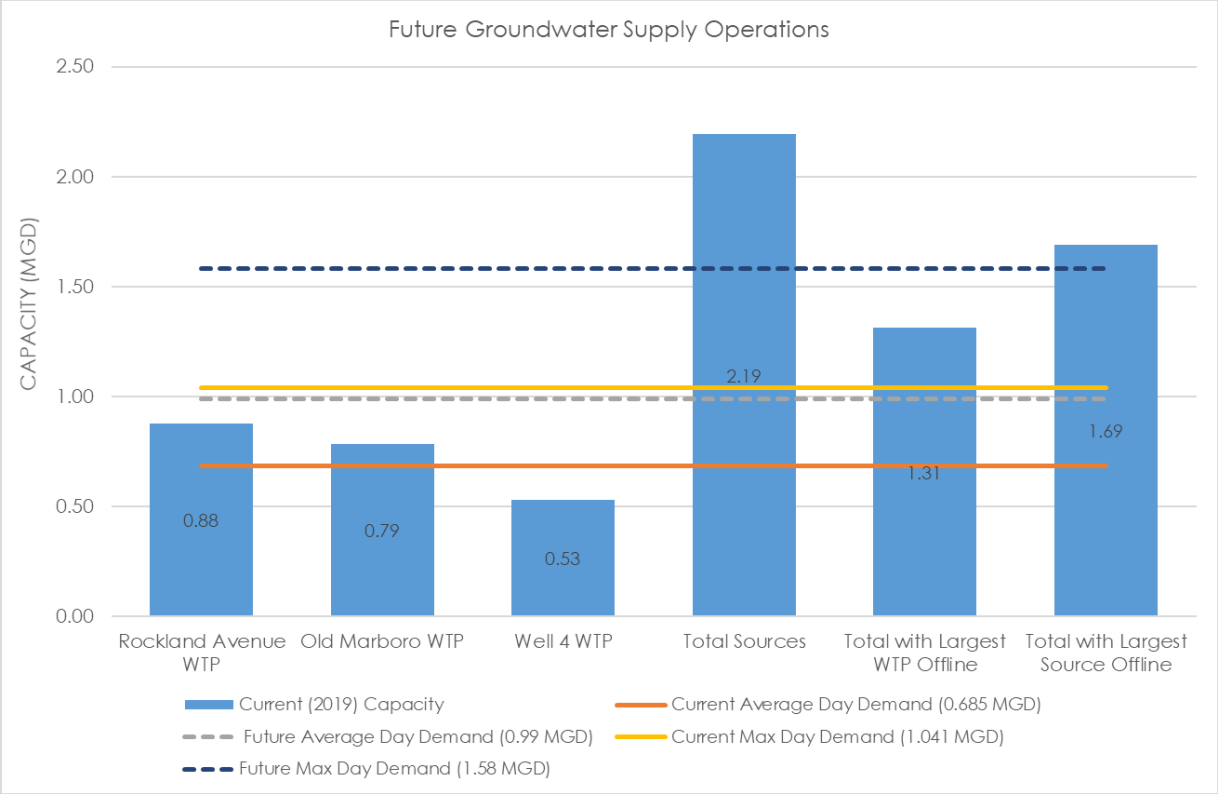

Figure 2 – Future Capacity with Groundwater Source Improvements & OMR WTP Treatment Upgrades

In Figure 3, the addition of a 1 MGD WTP treating surface water from White Pond is included, in addition to all the well source improvements/expansions included in Figure 2. This scenario assumes that the White Pond WTP would have a 1 MGD average day capacity, treating source water solely from White Pond. There is the possibility to combine treatment of Well 4 and OMR wellfields with White Pond water at a centralized WTP. These concepts are discussed in detail in the “White Pond Treatment and Transmission Study Report”. With improvements to existing well fields, upgrades to the OMR WTP, and commissioning of a new White Pond WTP the Town would be able to meet all average and maximum day

Reference: **Maynard Water Capacity Questions - REVISED**

demands under all operating circumstances (even with the largest WTP or largest source being offline) both now and in the future.

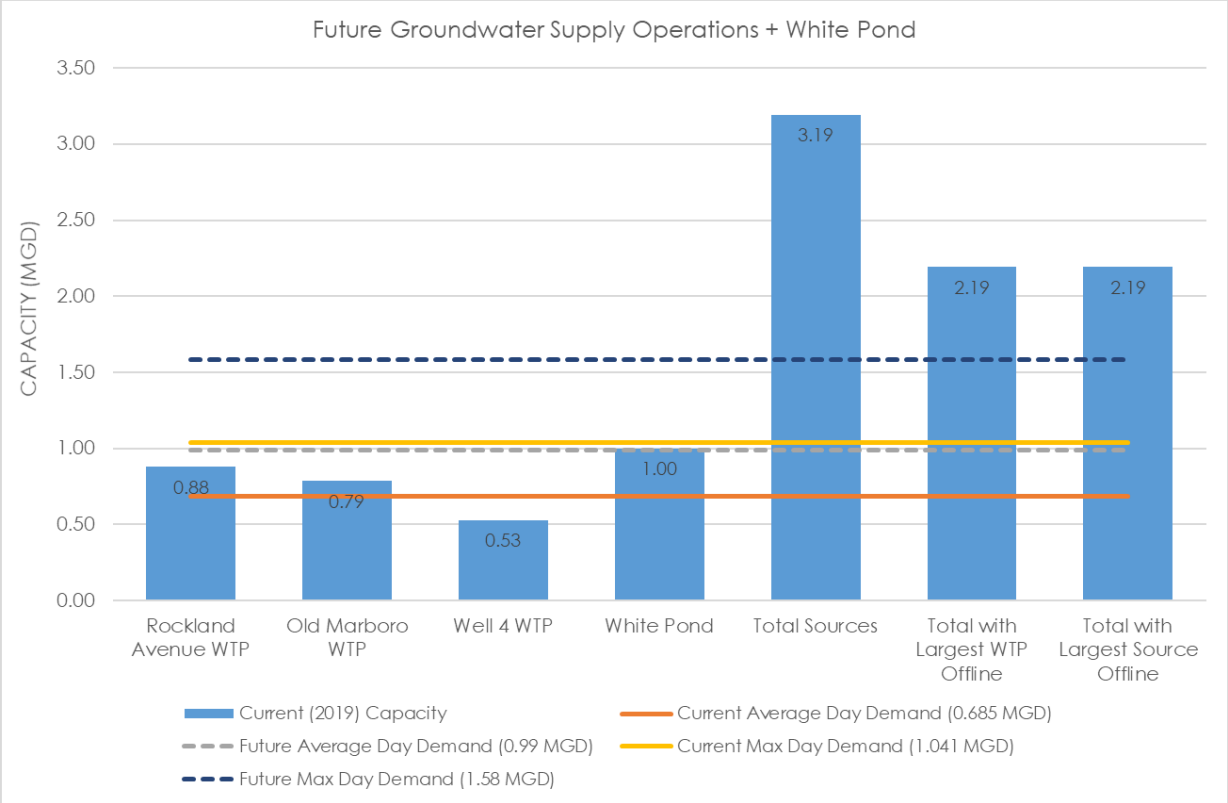

Figure 3 – Future Capacity with Groundwater Source Improvements & OMR WTP Treatment Upgrades & New White Pond WTP

WATER USE ESTIMATES

For design purposes, it is typical to utilize the information provided in 310 CMR 15.00: Septic Systems "Title 5" to estimate sewer system flows. Section 15.203 of “Title 5” provides sewer system design flows for various types of establishments. Table 1 summarize the typical sewer and water flows associated with various types of establishments that may pursue development in the Town of Maynard.

Table 1 – Water and Sewer Flows for Various Types of Establishments

Type of Establishment	Unit	Gallons Per Day
RESIDENTIAL		
Single Family Dwelling (including condos)	per bedroom	110
Multiple Family Dwelling	per bedroom	110
Motel, Hotel, Boarding House	per bedroom	110

Reference: **Maynard Water Capacity Questions - REVISED**

Type of Establishment	Unit	Gallons Per Day
Housing for the Elderly	per two-bedroom unit	150
COMMERCIAL		
Barber Shop/Beauty Salon	per chair	100
Doctor Office	per doctor	250
Dentist Office	per dentist	200
Factory, Industrial Plant, Warehouse, or Dry Storage Space without Cafeteria	per person	15
Factory, Industrial Plant, Warehouse, or Dry Storage Space with Cafeteria	per person	20
Lounge/Tavern	per seat	20
Office Building	per 1000 square feet	75
Retail Store (except supermarkets)	per 1000 square feet	50
Restaurant	per seat	35
Restaurant, Fast Food	per seat	20
Supermarket	per 1000 square feet	97
INSTITUTIONAL		
Function Hall	per seat	15
Gymnasium	per participant	25
Nursing Home/Rest Home	per bed	150
Assisted Living Facilities	per bed	150
Day Care Facility	per person	10
SCHOOLS		
Elementary School, without Cafeteria, gym, or showers	per person	5
Elementary School, with Cafeteria but no gym or showers	per person	8
Elementary School, with cafeteria, gym, and showers	per person	10
Secondary School, without Cafeteria, gym, or showers	per person	10
Secondary School, with Cafeteria but no gym or showers	per person	15
Secondary School, with cafeteria, gym, and showers	per person	20
Boarding Schools, Colleges	per person	65

Stantec Consulting Services Inc.

Katie Chamberlain P.E.
Associate

Phone: 781 221 1156
Katie.Chamberlain@stantec.com