
To: Justin DeMarco
Department of Public Works
Maynard, MA

From: Garry McCarthy/ Victor Olson
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Date: June 13, 2024

Reference: Water and Sewer Capacity Memo – 111 Powder Mill Rd Residential Development, Maynard, MA

The intent of this memo is to provide information related to the Town's drinking water supply capacity, water demands, and the ability of the drinking water system to supply water to the planned development. The memo also addresses concerns to provide sewer service from the site.

The developer's engineer has prepared two master planning alternatives for this site, described as follows:

- Scheme B - 438 residential units (2 bedrooms) with 75,000 square feet of commercial space.
- Residential Alternative – 557 residential units (2 bedrooms) with no commercial component.

111 POWDER MILL RD DEVELOPMENT WATER DEMANDS AND SEWER FLOWS

The proposed location for 111 Powder Mill Rd Development is the old Digital Equipment Corp property near the town line with Acton and Concord.

Water demands for this future development were estimated assuming:

- 310 CMR 15.00: Septic Systems "Title 5" flow guidelines @ 110 GPD/bedroom.
- Commercial space @ 75 GPD/1,000 SF (Office)
- Water Demand assumed to be 110% of the Title 5 Sewer Use values.
- All residential units assumed to be 2-bedroom.

Based on these assumptions, the estimated average daily water usage for each alternative follows.

Scheme B Alternative - Water, with 438 residential units with a total of 876 bedrooms and 75,000 square feet of commercial space will be approximately 112,184 GPD. Considering a 1.65 ratio of maximum day demand to average day demand, the maximum day demand is 185,100 GPD.

Residential Alternative - Water, with 557 residential units with a total of 114 bedrooms and zero square feet of commercial space will be approximately 134,794 GPD. Considering a 1.65 ratio of maximum day demand to average day demand, the maximum day demand is 222,400 GPD.

Sewer flows for this future development are also estimated assuming:

- 310 CMR 15.00: Septic Systems "Title 5" flow guidelines @ 110 GPD/bedroom.
- Figure 2-1 Ratio of Extreme Flow to Average Daily Flow (*from the WEF/ASCE publication, MOP-FD-5 Gravity Sewer Design and Construction*)
- Gravity sewers should be designed on a peak hourly design flow basis. The ratio of Maximum 24-hour to Average daily discharge is 3.0 and the ratio of Peak on maximum day to Average daily discharge is 5.6. Title 5 includes a 200% peaking factor for design of septic systems. Dividing the

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Title 5 flows in half and applying the peaking factor (5.6) gives a Maximum 24-hour flow of 308 GPD for sizing sewers. The peak on maximum day peaking factor of Title 5 Flows is 2.8.

- All residential units assumed to be 2-bedroom.

Based on these assumptions, the estimated average daily sewage discharge flow at 111 Powder Mill Road for each alternative follows.

Scheme B Alternative - Sewer, with 438 residential units with a total of 876 bedrooms and 75,000 square feet of commercial space will be approximately 101,985 GPD. Peak flows for design of sewers are 285,558 GPD.

Residential Alternative - Sewer, with 557 residential units with a total of 114 bedrooms and zero square feet of commercial space will be approximately 122,540 GPD. Peak flows for design of sewers are 343,112 GPD.

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 2022, the average day demand was 0.748 Million Gallons Per Day (MGD) and the maximum day demand was 1.13 MGD.***

The water demands from future buildup of developments were added to the future residential water demand estimated in the "White Pond Treatment and Transmission Study Report", resulting in ***future water demand estimates: an average day water demand of 1.19 MGD and a maximum day demand of 1.97 MGD.*** This includes a 2% contingency for unknown future developments in Town and assumes that unaccounted for water decreases to 10% by 2045.

CURRENT WATER SUPPLY CAPACITY

Detailed documentation of the Town's water sources, and capacity of each source, is also 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 (2017-2022).

The Town of Maynard recently completed upgrades to the Well #4 Water Treatment Plant including installation of new well field to increase capacity from .327 MGD to .504 MGD. Despite this upgrade the water supply is insufficient to meet current average supply demands when the Rockland Avenue WTP and Wells are offline for required maintenance. This figure also shows the average and maximum day water demands for the current and future scenario with future development demands included.

There are four key takeaways from Figure 1:

1. The Town can meet average day demands currently, unless the largest WTP (Rockland Ave) is offline. Common water supply planning practice requires satisfying average demands with the largest source offline.
2. The Town is unable to meet current maximum day demands with current water supplies. The Town will need to rely on the water storage tanks and increased pumping capacity of one or more wells in

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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 of Maynard also implements outdoor water use restrictions to manage maximum day water demands.
4. The Town of Maynard cannot currently accommodate new, significant water demand increases without new sources.

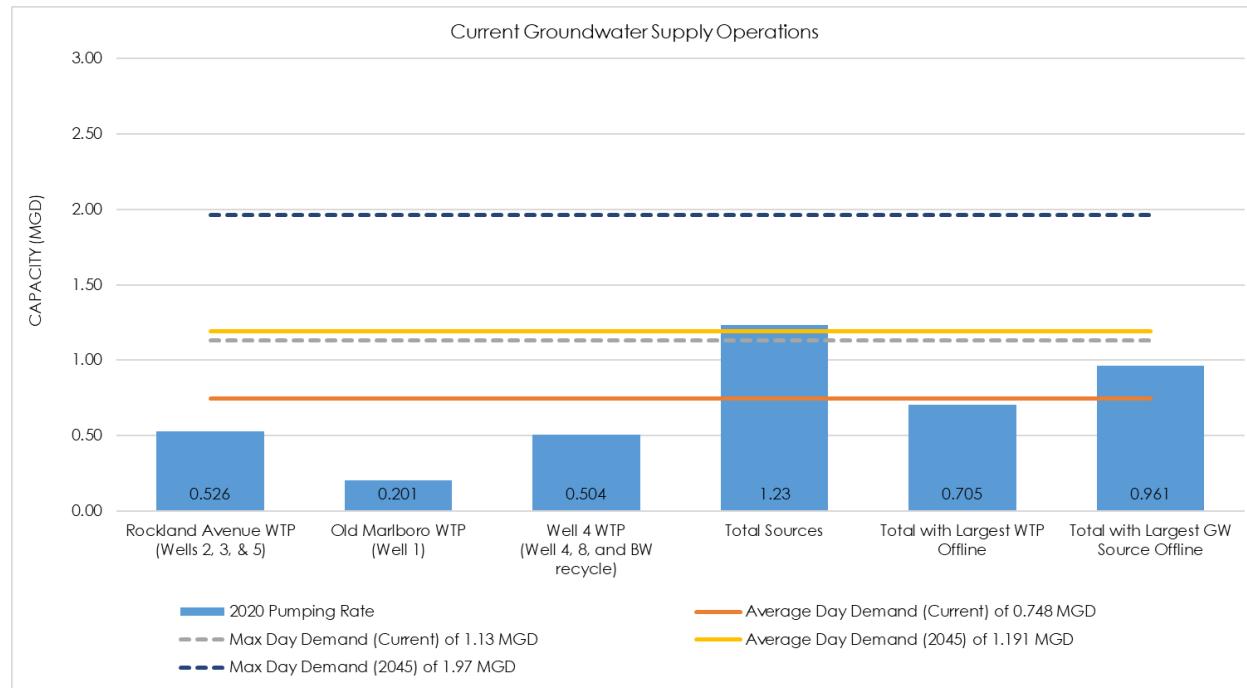


Figure 1 – Current Drinking Water Supply Capacity

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 and water treatment plants:

- **Well 4A WTP:**
 - New well sources at the Well 8 field was constructed and recently brought online in 2024.
 - The project also implemented filter backwash waste recycling, which allows for an additional 10% capacity at the WTP.

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Despite this expansion the water supply is unable to meet current demands completely per regulatory requirements. As such, additional improvements to existing well fields and water treatment plants and development of new well source are required to move through the permitting and design process.

- Rockland Avenue WTP:
 - 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 Summer 2027.
 - Implement filter backwash waste recycling, which will allow for an additional 10% capacity at the WTP.
- Old Marlboro Road WTP:
 - 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 additional 0.5 MGD of capacity.

It is anticipated that permitting, design and construction of these projects could be finished no sooner than the Summer 2029. The regulatory and permitting process drives the timeline to get this work completed.

Figure 2 shows the average and maximum day water demands for the current and future scenario with the identified future development demands included. The Town can significantly increase their ability to meet future water demands by implementing these well field source and WTP improvements. The only shortcoming is with regards to capacity if the largest individual source or largest water treatment facility were to be offline for maintenance or equipment failure; 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.

In Figure 3, the addition of a new source of water from connection to the Massachusetts Water Resources Authority (MWRA) system is included, in addition to all the well source and WTP improvements/expansions included in Figure 2. This scenario assumed that an MWRA interconnection would provide a maximum of 1.7 MGD capacity. With a connection to MWRA's supply, the Town would be able to meet all average and maximum day demands under all operating circumstances well into the future. The Town has been engaged in meetings and a planning project with MWRA to develop a plan for expansion of the MWRA system into the Metro West communities. At this time, the project is in early planning stages and is not a certainty. If the MWRA Metro West expansion project proceeds, it is believed at this time that the best-case scenario would have MWRA supply accessible to the Town of Maynard in 7 years (i.e., 2031) or more.

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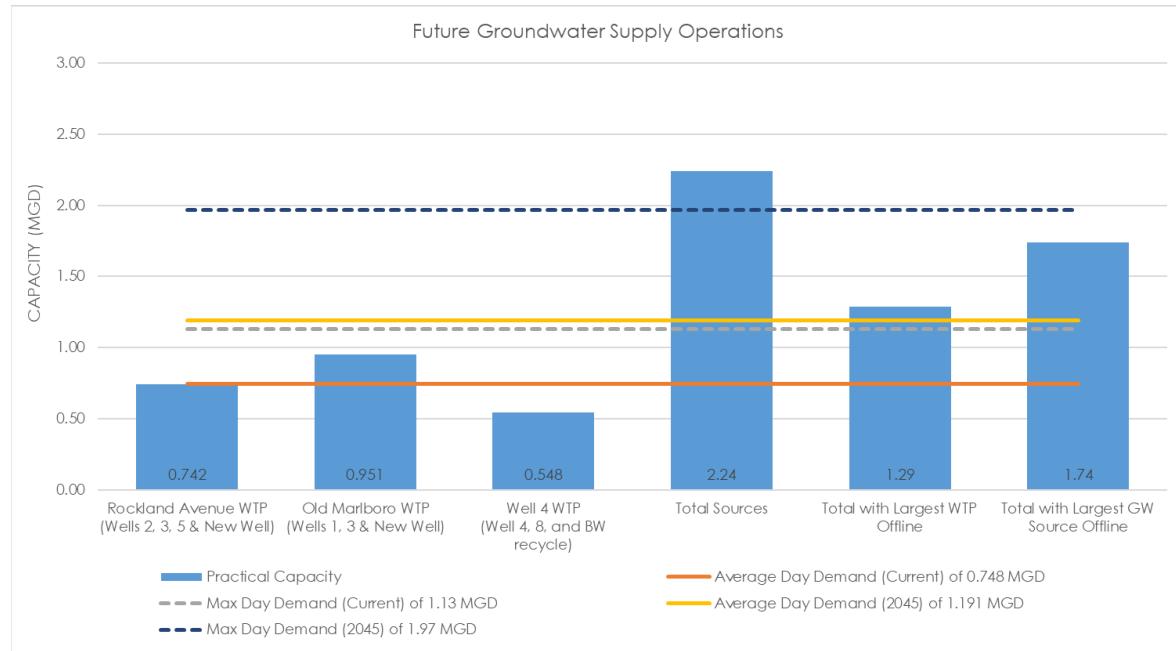


Figure 2 – Future Capacity with Groundwater Source Improvements & OMR WTP Upgrades

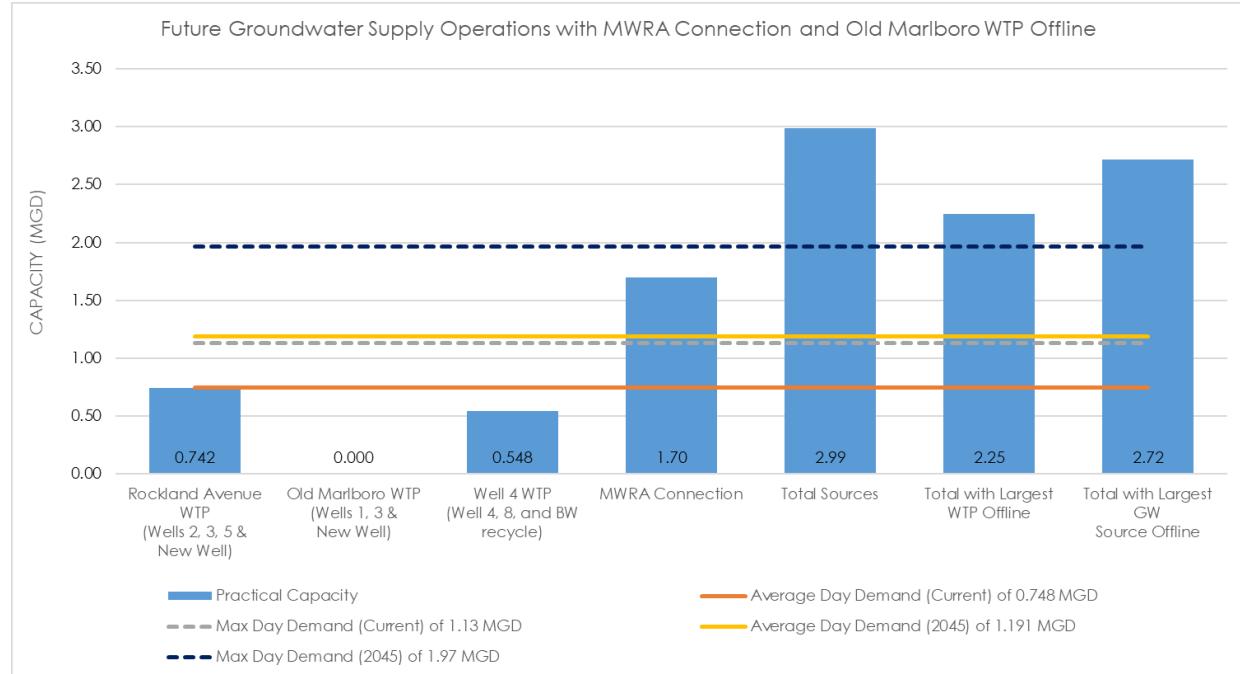


Figure 3 – Future Capacity with Groundwater Source Improvements (OMR WTP Treatment Offline) & New MWRA Source

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STRATEGY TO INCREASE WATER SUPPLY

The Town has completed the first phase of a 4-phased approach to increasing the water supply capacity in the water system, as follows:

Phase 1: Increase capacity at Well 4 water treatment facility by adding a new well supply (Well 8) and adding backwash waste recycling at the WTP - **Completed**.

Phase 2: Increase capacity at Rockland Avenue water treatment facility by adding a new well supply and adding backwash waste recycling at the WTP.

Phase 3: Increase capacity at Old Marlboro Road water treatment facility by upgrading the treatment process, which will allow for Well 3 to be brought back online.

Phase 4: Connect to MWRA system, eliminate Phase 3 and abandon existing Old Marlboro Road WTP and sources.

The Town's 4-Phase Strategy to Increase Water Supply was developed prior to the EPA PFAS MCLs being published, so this strategy does not take into consideration the need for PFAS treatment upgrades at the water treatment facilities. Additional upgrades required for PFAS treatment may extend the timeline.

111 POWDER MILL ROAD DEVELOPMENT WATER SUPPLY AVAILABILITY

The Town of Maynard's drinking water system is currently unable to supply water at the estimated average daily water usage rates of 112,184 GPD and 134,794 GPD for the Scheme B or Residential Alternative respectively, at the planned development at 111 Powder Mill Road. The Town is moving forward with a phased program to expand its water supply. It will take at least 5 -years to implement through Phase 3 completion, at which time the Town could consider new significant water supply requests.

111 POWDER MILL ROAD DEVELOPMENT SEWER AVAILABILITY

There is an existing 8-inch vitrified clay gravity sewer in Powder Mill Road with a shallow sewer manhole, B11, at the end of the sewer near the Concord town line that the existing private sewer from the 111 Powder Mill Road site is connected for discharge into the Maynard Sewerage System. The existing sewer in Powder Mill Road was inspected in 2018 by closed circuit television which noted several defects and cracking which would be negatively impacted with increased flows. In addition, the sewer is relatively flat and previous modeling indicated it had minimal capacity. It may need to be upgraded and increased in size to accommodate additional flows.

This sewer also connects just downstream to the Town of Maynard's Powder Mill Sewer Pump Station. The Town has recently completed preliminary design to upgrade capacity and replace the existing pump station and to add a redundant force main to meet long term capacity needs. The Town is pursuing funding to move forward with the design and permitting to replace the critical pump station in its sewerage collection system.

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New flows and peak flows will need to be evaluated to determine impacts to the downstream sewer infrastructure. The design of these facilities shall be such to mitigate impacts to downstream facilities and infrastructure beginning at sewer manhole number B11.

CONCLUSION

- 1. The Town of Maynard cannot currently grant the request to connect to the water system since it cannot accommodate new, significant water demand increases for Scheme B nor Residential Alternative without new water supply sources.**
- 2. An evaluation of downstream sewerage infrastructure from the discharge point to the existing Powder Mill Pump Station is required to assess impacts and possible downstream mitigation such as replacement of section of existing sewer to accommodate increased flows.**

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