Stantec

Water Supply and Treatment Master Plan

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Prepared for:

Department of Public Works,
Maynard, MA

Prepared by:

Stantec Consulting Services Inc.,
Burlington, MA

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EXECUTIVE SUMMARY

The Town of Maynard's Water Supply and Treatment Master Plan for 2025 addresses the critical need to ensure a sustainable and reliable water supply for the community. This Master Plan evaluates the current state of the Town's water treatment infrastructure, identifies key challenges, and proposes strategic improvements to meet future water quality and quantity demands.

The Town operates three water treatment plants (WTPs): Old Marlboro Road (OMR), Green Meadow, and Rockland Avenue. Each plant faces unique challenges, including aging infrastructure, water quality issues, and regulatory compliance requirements. The primary water quality concerns include iron, manganese, and PFAS in the water supply, as well as elevated disinfection byproducts (DBPs) in the distribution system. These water supply issues have caused operational difficulties at the WTPs, leading the Town to reduce withdrawal of well water to improve water quality. This strategy poses a challenge to the system, because projections indicate significant increases in water demand by 2045 and 2075, driven by residential and commercial growth. The average day demand (ADD) and maximum day demand (MDD) are expected to rise accordingly. This Master Plan seeks to address the issue in three possible ways:

- Explore ways to address water quality and quantity needs exclusively through local sources of water,
- Provide water supply exclusively through a future (2045) connection to Massachusetts Water Resources Authority (MWRA) water, or
- Provide water through a combination of local and outside sources.

One of the main goals of the Master Plan is to provide a framework for proactive planning rather than reactive response. This means prioritizing work based on regulatory compliance deadlines and likely near-term water quality violations while also bundling together important upgrades to future-proof the system. Part of that strategy is assessing future regulatory changes to water quality.

Fourteen alternatives were identified to meet the Town’s water supply and quality goals while providing the desired redundancy and resiliency. The first set of alternatives were divided into two categories: combining the OMR and Green Meadow WTPs or keeping them separate. These options were subdivided into options where the OMR WTP is upsized (as the only WTP located in an aquifer with underutilized capacity) or OMR maintains the same capacity. Finally, each of those options could involve decommissioning of one or more WTPs when an interconnect with the MWRA system becomes available. Two alternatives were selected for further development:

1. Combining the OMR WTP with the Green Meadow WTP, maximizing the combined WTP size based on the available aquifer capacity, and upgrading the Rockland WTP with the intention of operating it long-term alongside a future MWRA interconnect, and

2. Combining the OMR WTP with the Green Meadow WTP, maximizing the combined WTP size based on the available aquifer capacity, and upgrading the Rockland WTP with the intention of decommissioning it when an MWRA interconnect is placed into service.

In order to further evaluate these alternatives and make a recommendation, cost estimates will be utilized from the forthcoming OMR Treatment Feasibility Study and MetroWest MWRA Feasibility Study.

Regardless of the alternative selected, several treatment, water supply, and planning projects were identified as necessary to address shortfalls in the immediate term. Broadly, these include:

- Development of new well sources at Rockland Avenue and OMR,
- Distribution system evaluation for storage, water age, and water quality,
- Implementing PFAS treatment for all water sources, and
- Implementing the necessary pre-treatment to ensure PFAS processes are efficient and to address contaminants that are violating current water quality standards or close to violating future water quality standards.

A road map was developed that identifies required future work and prioritizes them based on immediate upgrades required to meet regulatory deadlines and proactive planning for the 2045 to 2075 time period. The road map is meant to be adapted based on actual observed conditions and population growth patterns in the Town and should be revisited on a regular basis.

1.0 INTRODUCTION

The Town of Maynard (the Town) has undertaken the development of this Master Plan to address current and future water quality and capacity needs under a 50-year planning horizon (2075). The Town currently operates seven wells across three water treatment plants (WTPs): Old Marlboro Road (OMR) WTP, Green Meadow WTP, and Rockland Avenue WTP. The water sources for each of these WTPs face a variety of quality issues, including iron and manganese exceeding Environmental Protection Agency (EPA) Secondary Maximum Contaminant Limits (SMCLs); manganese exceeding the US EPA health advisory (HA) and Massachusetts Department of Environmental Protection (MassDEP) Office of Research and Standards Guideline (ORSG) of 0.3 mg/L; and PFAS concentrations in excess of EPA Maximum Contaminant Limits (MCLs). There are also elevated disinfection byproducts (DBPs) in the distribution system, likely due to high total organic carbon (TOC) content in the source water.

Several components of the water treatment system that are approaching the end of their useful life and need either repair or replacement. The need for these upgrades coincides with all three plants requiring the addition of PFAS treatment facilities ahead of the 2029 EPA PFAS treatment compliance deadline.

In the face of the need for water treatment upgrades, the water supply is stressed. This is due to drought, but it is also exacerbated by worsening raw water quality issues that cause operators to throttle well sources so as not to overwhelm the existing WTPs. While the water supply is decreasing, population and development in the Town are increasing, resulting in increased water demand.

The goal of this Master Plan is to identify both short-term and long-term solutions to meeting the Town's capacity needs as well as complying with current drinking water regulations. This Master Plan seeks to evaluate three alternatives for meeting the long-term capacity needs of the Town:

- 100% reliance on local sources for water supply;
- Partial reliance on local sources of water, and partial reliance on a new connection to the Massachusetts Water Resources Authority (MWRA) system for supply; and
- 100% reliance on a future connection to the MWRA system.

These alternatives must be considered against the backdrop of two planning horizons given the uncertainty of gaining access to the MWRA system. Even if an MWRA connection were to become available to the Town, it is unlikely to happen any sooner than 2045 due to the complexity of project coordination across many communities and funding.

Key considerations for the treatment plant upgrades include existing and potential future regulations for water quality. Additionally, redundancy and resiliency must be considered to allow for components of the water system to be shut down for maintenance, upgrades, or emergencies. Thus, the redundancy goal for this Master Plan is to be able to meet the current and future average day demand and maximum day demand with either the largest well or largest water treatment plant out of service.

This Master Plan evaluates various supply alternatives, ultimately making a recommendation for a long-term water supply alternative considering several factors. The recommended water supply alternative is used as a baseline to develop a roadmap for upgrading the Town's water treatment and supply infrastructure over the 50-year planning period. This Master Plan is meant to be paired with both the forthcoming MetroWest MWRA Feasibility Study that will develop the cost of supplying water to MetroWest communities as well as the White Pond Water Treatment & Transmission Feasibility Study (2021).

2.0 WATER SOURCES

2.1 SOURCE WATER AVAILABILITY

As shown in Figure 2-1, Maynard has one surface water source (White Pond) as well as wellfields at OMR, Green Meadow, and Rockland Avenue. White Pond was used as a water source for the Town starting in the late 1800s, and it was taken offline in the late 1990s due to the new EPA Surface Water Treatment Rule, which imposed more stringent treatment requirements. From that point forward, the Town exclusively used its groundwater sources for supply. Table 2-1 summarizes the permitted maximum daily flow rates, rated pumping capacity, average annual flow rates, maximum observed daily flow rates, and the percentage of permitted flow pumped on observed maximum flow days. Note that the maximum annual average flow that can be collectively withdrawn from all sources, including White Pond, is 1.09 MGD to comply with the Town's Water Management Act (WMA) Permit. Permitting documents are provided in Appendix A.

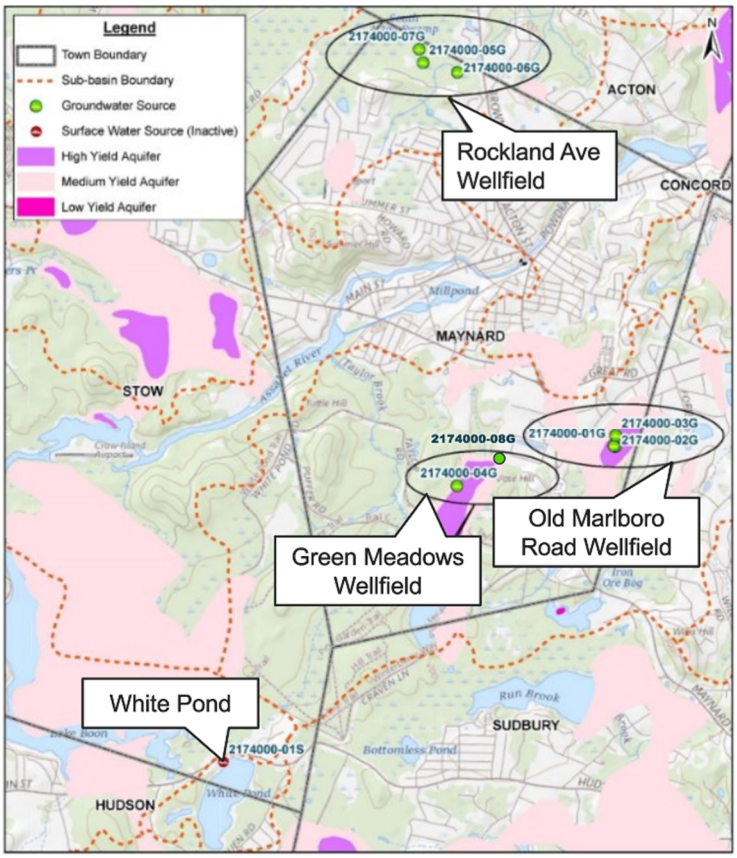


Figure 2-1. Maynard Water Supply Sources

Table 2-1. Summary of Groundwater Source Capacity and Flow Rates.

Source	Permitted MAX Daily Flow[1] (MGD)	Pumping Capacity[2] (MGD)	AVG Production[3] (MGD)	MAX Single Day Pumped Volume[4] (MG)	MAX Single Day Pumped/ Permitted MAX Flow
Old Marlboro Road (2174000-02T/-05T)					
Well #1 (2174000-01G)	0.870	0.576	0.216	0.358	41%
Well #1A (2174000-02G)		0.288			
Well #3 (2174000-03G)[5]		0.504	N/A	N/A	N/A
Total	***0.870***	***1.368***	***0.237***	***N/A***	***N/A***
Green Meadow (2174000-04T)					
Well #4 (2174000-04G)	0.380	0.648	0.229	0.300	72%
Well #8 (2174000-08G)[6]	0.346	0.415	0.198	0.393	114%
Total	***0.726***	***1.063***	***0.427***	***N/A***	***N/A***
Rockland Avenue (2174000-03T)					
Well #2 (2174000-05G)	0.464	0.432	0.155	0.181	39%
Well #3 (2174000-06G)	0.287	0.432	0.159	0.165	58%
Well #5 (2174000-07G)	0.379	0.379[7]	0.137	0.170	45%
Total	***1.130***	***1.243***	***0.450***	***N/A***	***N/A***
System Total	**2.726[8]**	**3.673**	**1.115**	**N/A**	**N/A**

Notes:
[1] Maynard 2174000 WMA Final Permit (2021-08-26).
[2] Rated mechanical pumping capacity.
[3] 2020-2024, except where noted.
[4] In year 2024. Maximum day for individual wells did not necessarily occur on the same day.
[5] Offline since 2010.
[6] Combined flows of Well 8 based on 2024 SCADA history records.
[7] Assumed to be permitted flow rate in absence of rated pumping capacity information.
[8] This is the sum of the permitted maximum daily flows, but the system is limited to 1.09 MGD in average annual daily flow.

2.1.1 Old Marlboro Road Well Sources

The OMR wellfield consists of three gravel packed wells that went online in 1963. These wells extend to a depth of approximately 35 feet below the ground surface. Well 1A (2174000-02G) serves as a satellite well that feeds into Well 1 (2174000-01G) to maintain capacity. The raw water contains iron, manganese, and organics that are treated at a GreensandPlus™ filtration plant. It has been observed that higher pumping rates increase the color of the raw water, and so operators limit Wells 1 and 1A to lower pumping rates than permitted or designed for. Approximately 15 years ago, a decrease in the water quality from Well 3 was observed, with a notable change in the color of the water. At the same time, it was also observed that the wetland area near the OMR wellfield was behaving differently than it had been historically. It is believed that the hydrogeology of the Well 3 area was impacted after a housing development was built in the bordering Town of Sudbury, located upslope from the OMR wellfield. Prior to the development, there was a seasonal stream that fed the wetlands. That stream no longer exists. Due to the significant decrease in water quality, Well 3 was taken offline in 2010. As shown in Table 2-1, this site is operating at 41% of its permitted maximum capacity.

A test well investigation completed at OMR in 2021 found that test well TW2-21 could be expected to produce 1 MGD in addition to the current production of the existing operational wells. Test well TW3-21 was also found to be able to produce 0.5 MGD. Based on a cursory hydrogeologic evaluation (that needs to be confirmed with multi-day pump testing), the site is collectively not likely able to produce more than 1 MGD in addition to what it is already permitted to produce, meaning it is expected that a maximum of 1.870 MGD can be withdrawn from this site on any given day with these new wells placed into service. However, these new wells, if permitted and utilized, are likely to have water quality limitations as well. Iron concentrations in the test wells ranged from 34.2 mg/L to 37.9 mg/L and manganese concentrations ranged from 0.545 mg/L to 0.928 mg/L. The secondary maximum contaminant limits for iron and manganese are 0.3 mg/L and 0.05 mg/L respectively.

2.1.2 Green Meadow Well Sources

The Green Meadow wellfield consists of Well 4 (2174000-04G), a gravel packed well, which went online in 1975, and a wellfield of four wells called Well 8 (2174000-08G), which commenced regular operation in February of 2024. The water is treated by GreensandPlus™ filtration. Well 4 extends to a depth of approximately 72 feet below the ground surface. As summarized in Table 2-1, despite routine maintenance, Well 4 is producing 72% of the permitted capacity.

The WMA permit places Well 8 under a special condition of regulation by the Natural Heritage and Endangered Species Program. The condition specifies a minimum seasonal groundwater level that must be maintained in the surrounding wetlands; if the minimum water level is not achieved, the Well 8 permitted capacity reduces by half. As shown in Figure 2-2, the wetland groundwater water level began decreasing towards the end of May 2024 and continued to drop steadily in the months when there is typically higher demand for water. In July, the Well 8 water level dropped below the minimum 1.78-foot level required by the permit during the summer, and the pumping rate was reduced to half capacity (0.172 MGD) accordingly. As shown in Figure 2-3, the water level remained low for several months. The permit requires a water level of 1.25 ft during the winter, so the pumping rate remained at half capacity. The pumping rate was returned to full capacity in December 2024 after the water level recovered above the threshold.

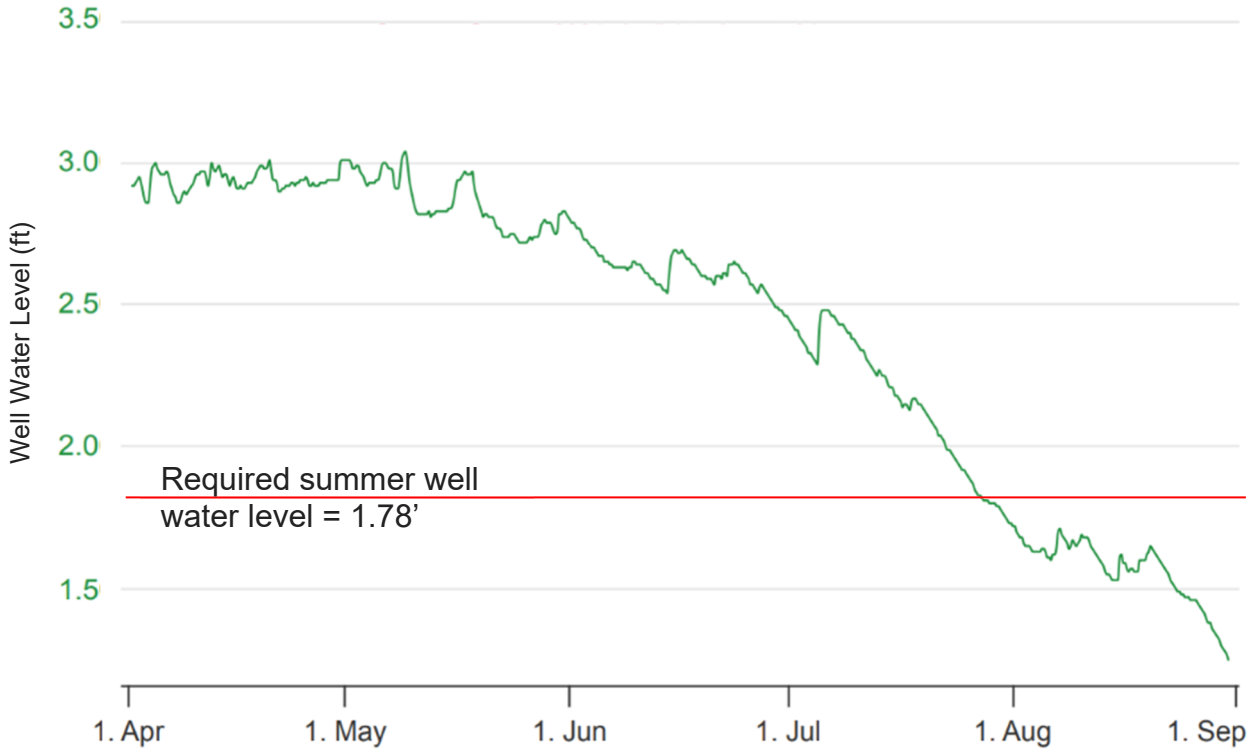


Figure 2-2. Well 8 Water Level (Summer 2024).

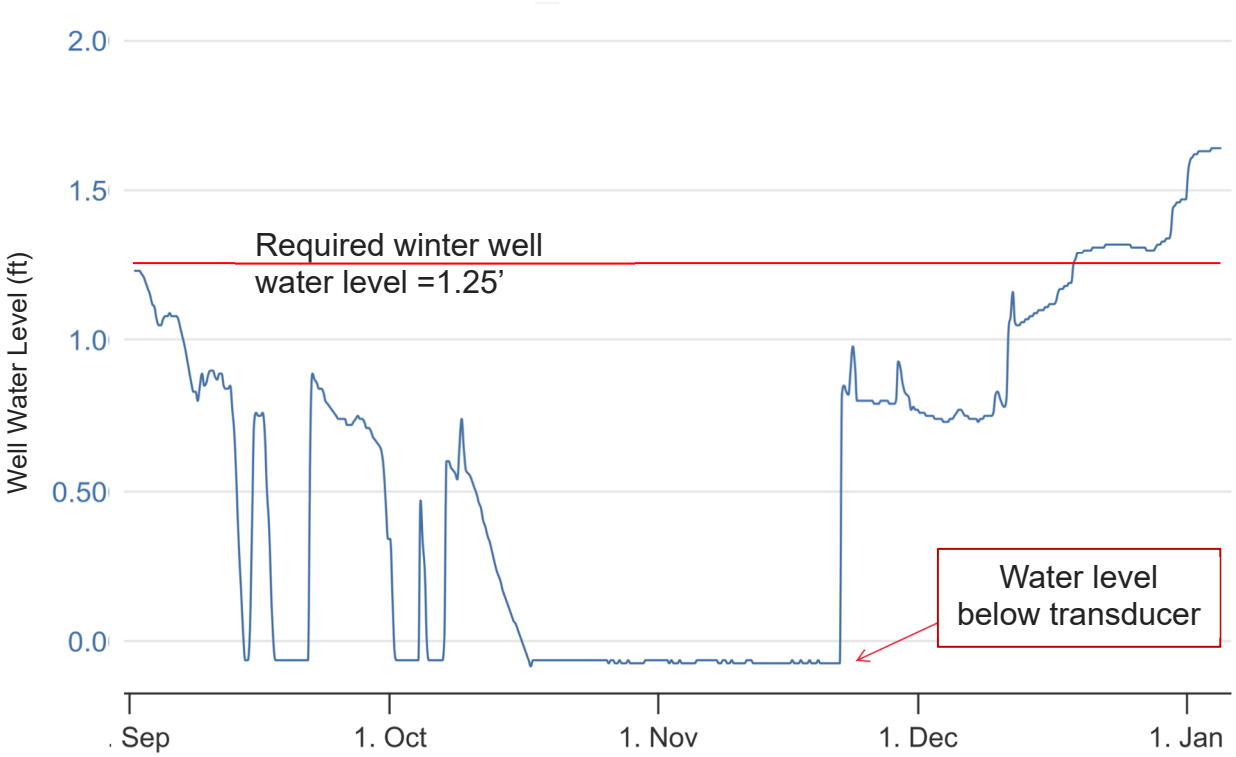


Figure 2-3. Well 8 Water Level (Fall/Winter 2024).

2.1.3 Rockland Avenue Well Sources

The Rockland Avenue wellfield comprises three bedrock wells that became operational in 2000. These wells extend to a depth of approximately 450 feet below the ground surface into bedrock. The well water is treated for iron and manganese at a GreensandPlus™ filtration plant. After Well 3 (2174000-06G) was rehabilitated in 2018, it was placed back online in early 2019. From that point forward, the well produced a maximum of around 0.28 MGD, which is less than the annual average 0.304 MGD that it produced in 2017. The reduced Well 3 production, along with persistent drought conditions, has resulted in significantly reduced production capacity at Rockland Avenue wells, as shown in Figure 2-4. Furthermore, since Well 3 was put back online, the water quality has been observed to be extremely variable and has very high iron, total dissolved solids, turbidity, color, and relatively high concentrations of manganese compared to the two other wells at Rockland Avenue. The poor water quality has resulted in shorter filter run times and other operational difficulties. Moreover, shorter filter runtimes result in more frequent backwashing of filters, thereby reducing the finished water production rate of the Rockland Avenue WTP. As shown in Table 2-1, the average production of this wellfield from 2020-2024 was 0.450 MGD, compared to an estimated permitted withdrawal of 0.726 MGD, and the maximum volumes pumped from each individual well was between 39% and 58% of the permitted capacity.

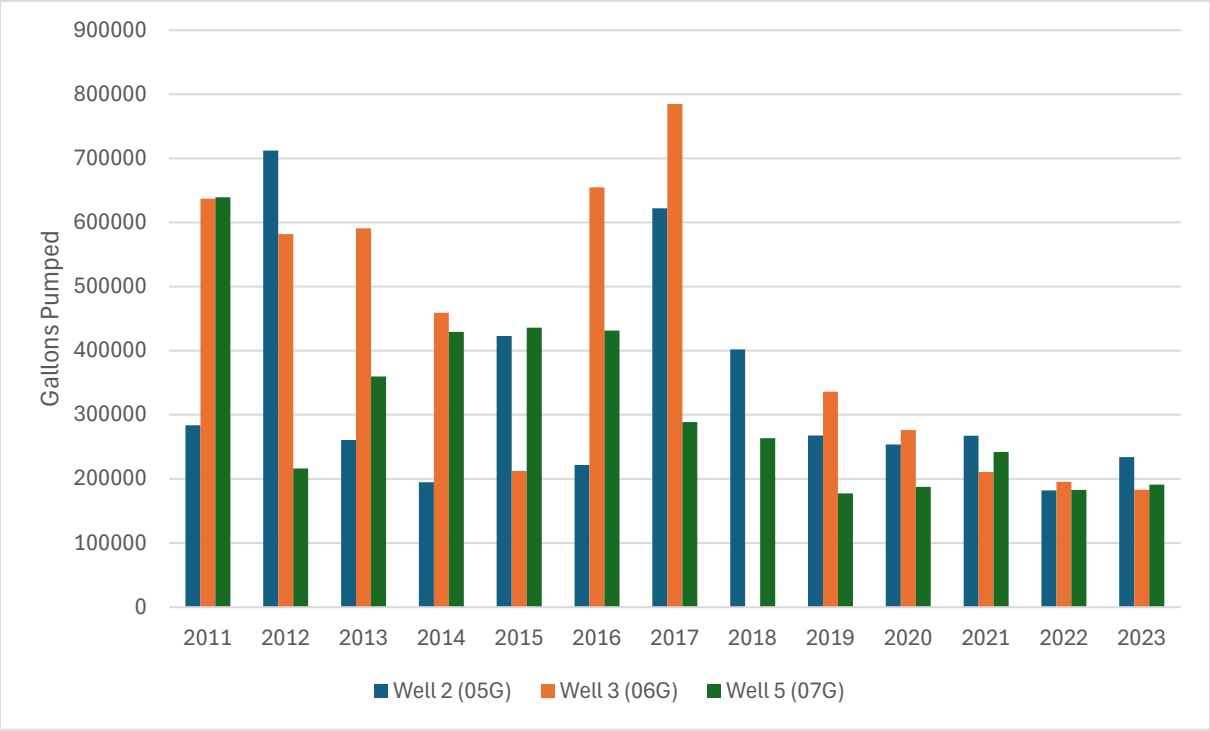


Figure 2-4. Rockland Avenue Maximum Single Day Production.

In March of 2025, Verdantas LLC conducted an 8-hour preliminary pumping test on old bedrock Test Well 1 at Rockland Avenue. Test Well 1 was originally installed in 1999; pump tested without combining pumping for Wells 2, 3, and 5; and found to yield 150 gpm. Ultimately, Test Well 1 was left dormant. The recent pump test showed that 100 gpm was the highest flow rate achievable for a pump that could fit into the 6-inch well casing. Analysis suggested 0.25 MGD could be achievable with an 8-inch replacement well, to be confirmed within 10-day pump testing. Water quality testing of the well showed 0.0117 mg/L of arsenic compared to a regulatory standard of 0.010 mg/L, 19.80 mg/L of iron, and 1.18 mg/L of manganese. Several regulated PFAS compounds were detected in the raw water but not at concentrations that exceeded regulatory standards. The Bedrock Test Well 1 Evaluation Memo prepared by Verdantas is provided in Appendix A.

June of 2025, Verdantas produced a lineament analysis to determine if there were viable locations for new wells at the Rockland Avenue site. Three areas were identified: 1) Between the parcels of 4 Rockland Avenue and 10 Rockland Avenue, south of the Avenue within the Rockland woods conservation area, 2) North of Rockland Avenue between two wetlands areas in the Town of Acton, and 3) north of Rockland Avenue near the WTP and Well No. 6 (unused). New wells could be useful in providing mechanical redundancy but will still be constrained by the overall capacity of the aquifer. New test wells will be pump tested and their viable yield will be determined in conjunction with assessing their influence on the production of other wells in the vicinity. A preliminary hydrogeologic evaluation estimates a total of 0.5 MGD in redundant well capacity might be found at this site through one or more new well sources; however, the capacity of this aquifer is likely close to the permitted limit (to be confirmed with

pump testing), meaning the total maximum daily withdrawal from combined sources at this site cannot likely be increased. The lineament analysis is provided in Appendix C.

2.1.4 Summary of Source Water Limitations

While the maximum permitted withdrawal from Maynard's groundwater sources on any given day is 2.726 MGD, the total system production is much lower for a variety of reasons. At OMR, there is likely available aquifer capacity to be pumping approximately 1 MGD more than is permitted for withdrawal. However, the wells have high levels of organics, iron, and manganese. Well 3 was taken offline entirely due to poor raw water quality, and operators reduce pumping rates of Wells 1 and 1A to improve raw water color. It follows that the maximum observed pumping rate for the wells that remain online is less than half of the permitted maximum pumping rate. New wells that have been explored at OMR have high levels of iron and manganese and will worsen raw water quality if blended with existing sources. Green Meadow has similar water quality to OMR but is also subject to special permit conditions that reduce the allowable pumping rate to half based on the groundwater level in the surrounding wetlands. Rockland Avenue struggles with variable water quality that makes the water treatment plant difficult to operate. Operational staff have responded by reducing the pumping rate. Additionally, the bedrock wells are affected by persistent drought and have been producing approximately half of what they were capable of producing before 2018. Potential new wells could add up to 0.5 MGD of mechanical redundancy at Rockland Avenue within the limits of the aquifer capacity and drought conditions. Theoretically, White Pond could be a source of additional water supply, but it would require a brand new treatment plant to place back into service.

2.2 WATER QUALITY CHALLENGES

2.2.1 National and State Drinking Water Regulations

The National Primary Drinking Water Regulations (NPDWR) are legally enforceable primary standards and treatment techniques that apply to public water systems. Primary standards, or maximum contaminant levels (MCLs), and treatment techniques (TT) protect public health by limiting the levels of contaminants in drinking water. Massachusetts has state-specific drinking water regulations per 310 CMR 22.00 which build on the EPA MCLs. The standards are enforced by MassDEP's Drinking Water Program. This section only covers regulations relevant to groundwater and for constituents that are known to occur in Maynard's wells. Volatile and semi-volatile organic compounds, radionuclides, and other inorganics are not discussed here as they have not been observed in Maynard's source groundwaters.

2.2.1.1 PFAS

Per- and polyfluoroalkyl substances (PFAS) are a class of widely used chemicals used in water resistant materials, firefighting foam, and non-stick coatings that are known to be harmful to humans at certain concentrations. New PFAS MCLs were announced by USEPA in 2024, promulgated on April 26, 2024, with a final rule effective date on June 24, 2024. The rule determines MCL compliance based on a

running annual average (RAA) of quarterly sampling. Initial monitoring must be complete by 2027, and PWSs must meet MCLs based on their RAA by April 2029.

As part of the new MCL, the EPA currently regulates six PFAS compounds (PFOA, PFOS, PFNA, PFHxS, PFBS, HFPO-DA), while Massachusetts regulates a different set of six compounds referred to as PFAS6 (PFOA, PFOS, PFNA, PFHxS, PFHpA, PFDA). The MCL for each regulatory agency is summarized in Table 2-2.

While the MCLs as described above remain in effect, on May 14, 2025, the EPA announced its intention to rollback the MCLs for PFNA, PFHxS, PFBS, and GenX and to extend the compliance deadline from 2029 to 2031. At this time, these changes are not in effect, and it is recommended that the Town proceed with the assumption that the current regulations and compliance deadline will continue to apply.

Per the current PFAS drinking water regulations, the Town will be required to achieve compliance with EPA PFAS MCLs in April of 2029. Compliance is defined as having a running annual average below the MCL at each of the WTP's entry points, meaning PFAS treatment will likely need to be operational for all well sources in the second half of 2028 to meet the MCL deadline. If the deadline for compliance shifts out by two years to April 2031, PFAS treatment would likely need to be operational in the second half of 2030 to meet the MCL deadline.

Although all three of the Town's WTPs are currently in compliance with the MassDEP PFAS6 MCL of 20 ppt, available data from 2019 to 2024 shows that there is PFOA in the finished water at every WTP that exceeds the EPA MCL of 4 ppt. Maximum PFOA concentrations in finished water were 10.4 ppt, 6.6 ppt, and 4.8 ppt at OMR, Green Meadow, and Rockland Avenue respectively. The maximum value observed in groundwater sources at OMR, Green Meadow, and Rockland during this time period was 8.5 ppt, 6.6 ppt, and 6.9 ppt respectively. Several other PFAS compounds were detected in groundwater and finished water below the EPA and state MCLs. A summary of the maximum PFAS concentrations observed in each individual well and WTP finished water is provided in Table 2-2.

White Pond is adjacent to, and downgradient of, a disposal site (Release Tracking Number 2-21045, Massachusetts Firefighting Academy) where historic use of aqueous film-forming foam (AFFF) was used for firefighting training. Efforts to investigate the release of PFAS to the environment by Academy training activities commenced in September of 2019 under the direction of MassDEP. In November of 2019, GZA was engaged to further delineate the extent of PFAS contamination. The investigation found that PFOS and PFNA were detected at concentrations over 1 million ppt in the top three feet of sediments in the wetlands at the disposal site. Several other PFAS compounds were detected as high as hundreds of thousands of ppt. In 2020, concurrent with the investigation, excavation of sediments within an on-site fire-fighting water collection tank was undertaken as a remediation measure. Historically, the accumulated sediment was disposed of on the ground surface surrounding the tank. After excavation, the top five feet of soil surrounding the tank was sampled, and high PFOS and PFNA concentrations on the order of 1 million ppt were found, with 1 PFOS detection over 11 million ppt. Regulated PFAS concentrations within groundwater monitoring wells at the site ranged from non-detect to tens of thousands of ppt during the initial investigation. Follow up sampling rounds conducted in the subsequent five years showed that groundwater PFAS concentrations had reduced to the hundreds of ppt.

As part of the initial delineation of contamination extents, several samples were taken from White Pond and analyzed for PFAS to determine if it had migrated into the surface water. PFOA was found at concentrations between 8.0 ppt and 11.4 ppt, while PFOS ranged from 8.7 ppt to 37.0 ppt. Data show there is significant variability in PFAS concentrations spatially in White Pond. Surface water samples taken near the northern edge of White Pond, closest to the disposal site, had PFAS6 concentrations (sum of PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFDA) as high as 94.6 ppt, while PFAS6 dropped to as low as 47.2 ppt toward the center of the pond. PFAS compounds in sediments within White Pond were generally not detected, except for one sample taken from the top 0.5' of sediment which had 8,400 ppt of PFOS and detectable PFNA below the laboratory reporting limit[1]. Appendix D provides a map of the disposal site (north of White Pond) and the former Town raw water pump house on the west side of the pond with presumed intake location, along with a summary of detected PFAS compounds in surface waters throughout the site as part of GZA's delineation efforts. On April 2, 2024, a sample was taken at the approximate intake of the former White Pond WTP. The results are summarized in Table 2-3. Furthermore, it is conceivable that PFAS from surrounding soil, sediments, and groundwater may migrate into White Pond and result in higher future PFAS concentrations near the intake.

PFAS was also sampled in the private drinking water wells of 12 residences surrounding the site, to the northwest (upgradient) of White Pond, as part of the original investigation. Each residence falls approximately within 0.25 miles of White Pond. PFAS was detected in the wells at low levels not exceeding the MCLs for drinking water. In August of 2020, GZA prepared Immediate Response Action Status Report No. 2, which provides additional detail for the work conducted to remediate PFAS contamination at the source and to delineate the extent of contamination in surrounding soil, wetlands, sediments, groundwater, surface water in White Pond, sediments in White Pond, and private drinking water wells.

[1] The laboratory reporting limit is the lowest concentration of a substance that a laboratory can reliably report as a quantifiable value. For the analytical method used to determine concentration in sediment, the reporting limit was 2,500 ppt. The concentration was found to be 2,200 ppt.

Table 2-2. Maximum Observed PFAS Concentrations from 2019-2025.

			OMR				
Compound	**EPA Standard**	**MassDEP MCL**	**Well 1**	**Well 1A**	**Wells 1 & 1A (Blend)**	**Well 3**	**Finished**
Regulated PFAS Compounds							
PFOA	4.0 ppt	See PFAS6	**8.5**	**8.1**	**8.4**	**7.6**	**10**
PFOS	4.0 ppt	See PFAS6	3.2	3.7	3.8	**4.4**	**6.2**
PFNA	10 ppt / Included in Hazard Index[2] (HI) Calculation	See PFAS6	ND	ND	ND	ND	0.4
PFHxS	10 ppt / Included in HI	See PFAS6	2.5	2.8	2.7	2.6	3.0
PFHpA	No EPA Standard	See PFAS6	2.7	2.7	2.9	2.2	3.7
PFDA	No EPA Standard	See PFAS6	ND	ND	ND	ND	ND
PFBS	Included in HI	NA	2.5	3.0	3.8	2.7	4.4
Gen X Chemicals (HFPO-DA)	10 ppt / Included in HI	NA	ND	ND	ND	ND	ND
Hazard Index[1]	1	NA	0.3	0.3	0.3	0.3	0.3
PFAS6[2]	NA	20 ppt	17	16	17	17	20
Non-Regulated PFAS Compounds							
PFUnA	NA	NA	ND	ND	ND	ND	0.6
PFHxA	NA	NA	4.1	2.7	4.0	2.8	5.2
PFDoA	NA	NA	ND	ND	ND	ND	ND
PFTeDA	NA	NA	ND	ND	ND	ND	ND
PFTrDA	NA	NA	ND	ND	ND	ND	ND
NMeFOSAA	NA	NA	ND	ND	ND	ND	1.1
NEtFOSAA	NA	NA	ND	ND	ND	ND	0.8
9Cl-PF3ONS	NA	NA	ND	ND	ND	ND	ND
11Cl-PF3OUdS	NA	NA	ND	ND	ND	ND	ND
ADONA	NA	NA	ND	ND	ND	ND	ND

	Green Meadow							Rockland			
Compound	**Well 4**	**Well 8-1**	**Well 8-2**	**Well 8-3**	**Well 8-4**	**Well 8 (Blend)**	**Finished**	**Well 2**	**Well 3**	**Well 5**	**Finished**
Regulated PFAS Compounds											
PFOA	**6.6**	3	**5.2**	**4.6**	**5.7**	**4.9**	**6.6**	3.8	**6.9**	3.9	**4.8**
PFOS	3.48	0.641	3.5	1.7	2.5	1.6	3.9	1.9	2.6	1.5	3.8
PFNA	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND
PFHxS	2.1	1.1	3.5	2.2	2.4	2.1	2.2	1.1	1.2	1.1	1.4
PFHpA	2.2	0.7	0.7	1.7	2.1	1.8	2.6	1.1	2.4	1.1	1.7
PFDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFBS	2.0	0.8	3.1	1.8	2.9	1.5	4.0	1.3	2.4	1.3	2.0
Gen X Chemicals (HFPO-DA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hazard Index[1]	0.2	0.1	0.4	0.2	0.3	0.2	0.3	0.1	0.1	0.1	0.2
PFAS6[2]	12	3.0	12	6.8	13	7.0	14	3.8	12	3.9	7.3
Non-Regulated PFAS Compounds											
PFUnA	0	0	0	0	0	0	0	ND	ND	ND	ND
PFHxA	3.2	2.1	3.7	2.9	3.9	2.9	4.2	1.6	4.0	1.8	4.2
PFDoA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFTeDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PFTrDA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NMeFOSAA	ND	ND	ND	ND	ND	ND	0.9	ND	ND	ND	0.9
NEtFOSAA	ND	ND	ND	ND	ND	ND	1.0	ND	ND	ND	1.0
9Cl-PF3ONS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11Cl-PF3OUdS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ADONA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

Concentrations reported in parts per trillion (ppt).

1. Hazard Index (HI) = $\frac{[HFPO-DA]}{10\ ppt} + \frac{[PFBS]}{2000\ ppt} + \frac{[PFNA]}{10\ ppt} + \frac{[PFHxS]}{10\ ppt}$

2. PFAS6 is the sum of concentrations of PFOS, PFOA, PFHxS, PFNA, PFHpA, PFDA.
NA – Not applicable
ND – Concentration not detectable
Bold concentration indicates violation of an MCL.

Table 2-3. PFAS Concentrations in White Pond.

Compound	EPA Standard	MassDEP MCL	Concentration (ppt)[1]
Regulated PFAS Compounds			
PFOA	4.0 ppt	See PFAS6	**7.5**
PFOS	4.0 ppt	See PFAS6	**11**
PFNA	10 ppt / Included in Hazard Index Calculation	See PFAS6	5
PFHxS	10 ppt / Included in Hazard Index Calculation	See PFAS6	6
PFHpA	No EPA Standard	See PFAS6	15
PFDA	No EPA Standard	See PFAS6	ND
PFBS	Included in Hazard Index Calculation	NA	1.6
Gen X Chemicals (HFPO-DA)	10 ppt / Included in Hazard Index Calculation	NA	ND
Hazard Index[2]	1	NA	1
PFAS6[3]	No EPA Standard	20 ppt	**45**

Notes:
1. Sampling at the White Pond WTP intake (4/2/2024).
2. Hazard Index (HI) = $\frac{[HFPO-DA]}{10\ ppt} + \frac{[PFBS]}{2000\ ppt} + \frac{[PFNA]}{10\ ppt} + \frac{[PFHxS]}{10\ ppt}$
3. PFAS6 is the sum of concentrations of PFOS, PFOA, PFHxS, PFNA, PFHpA, PFDA.
NA – Not applicable
ND – Concentration not detectable
Bold indicates exceedance of an MCL.

2.2.1.2 Arsenic Rule

Prolonged exposure to arsenic is linked to a variety of health conditions. The EPA and MassDEP have set an MCL for arsenic at 10 ug/L. According to the Energy & Environmental Affairs Data Portal, arsenic has been found in raw water at all three WTPs in Maynard at levels below the MCL, ranging from 1 ug/L to 8 ug/L from 2020 through 2024. Because the existing GreensandPlus™ filters are capable of removing arsenic, concentrations have not historically been detected in finished water.

2.2.1.3 Revised Total Coliform Rule/Total Coliform Rule

The Total Coliform Rule (TCR) and Revised Total Coliform Rule (RTCR) aim to minimize fecal pathogen contamination in drinking water through the regulation of total coliforms, which include fecal coliform and *E.Coli*. Regulatory assessments are triggered when a public water system (PWS) exceeds a specified frequency of total coliform occurrences and violates the MCL or fails to take repeat samples following a routine total coliform-positive sample. Any sanitary defects identified during these assessments must be corrected by the PWS. PWSs are also required to report any MCL violations to the state and notify the public in accordance with the Revised Total Coliform Rule. The Town of Maynard has had positive total coliform samples in past years. To reduce risks associated with coliform contamination and to avoid laborious assessments that may result in unrelated regulatory actions, 4-log virus inactivation must be implemented. 4-log virus inactivation can be achieved by dosing a chemical disinfectant to treated water and maintaining exposure for enough time to ensure viruses are inactivated. Inactivation can also be achieved by supplying a certain strength of UV to treated water, or a combination of other treatment techniques that add up to a total of 4 log credits. The Green Meadow WTP currently achieves 4-log inactivation, but the Rockland and OMR WTPs currently do not.

2.2.1.4 Stage 1 and Stage 2 Disinfectants/Disinfection Byproducts Rule

Disinfection byproducts (DBPs) are formed when disinfectants utilized to inactivate microbial pathogens react with DBP precursors such as natural organic matter. The majority of DBPs are formed by reaction to free chlorine to form trihalomethanes and haloacetic acids. The EPA's Disinfectant/Disinfection Byproducts Rule (DBPR) sets an MCL of 0.060 mg/L for five regulated haloacetic acids (HAA5) and 0.080 mg/L for total trihalomethanes (TTHM4) based on a locational running annual average (LRAA) of the most recent four quarters. Note that the occurrence of DBPs by sampling location is not necessarily directly a function of the nearby WTP, but is largely due to the water age at each sampling location, the DBP precursors present in raw and finished water, and the residual free chlorine.

As shown in **Figure 2-5**, the Town of Maynard currently samples four distribution system locations for DBPs. Figure 2-6 and Figure 2-7 show concentrations of TTHM4 and HAA5 respectively from quarterly sampling events between 2019 to 2024. Data show that TTHM4 levels are highest at location DBP4:12 Winter Street (DPW Highway Garage). Historically, there have been instances of individual TTHM4 concentrations greater than 0.080 mg/L, without an MCL violation based on the LRAA. In the second quarter of 2025, the Town exceeded the TTHM4 MCL at DBP4 with a LRAA of 82 ppb. There are no violations of the LRAA for HAA5 and no individual exceedances of 0.060 mg/L. The highest concentrations of HAA5 also occur at location DBP4.

The Town has made prior attempts to reduce formation of DPBs in the distribution system. OMR switched to potassium permanganate as a pre-oxidant for the GreensandPlus™ filters, which has a lesser proclivity to producing DBPs as compared to chlorine, which they were originally using. The Town reduced their chlorine dosing for disinfection, maintaining a lower residual in the system and thereby reducing DBP formation potential. As part of ongoing attempts to prevent future violations, the Town will also be switching from chlorine pre-oxidant at Green Meadow to potassium permanganate.

2.2.1.5 Lead and Copper Rule/Revised Lead and Copper Rule

The Lead and Copper Rule (LCR) was first promulgated in 1991 and requires PWSs to reduce levels of lead and copper in drinking water. Lead can leach into water from lead pipes, faucets, and fixtures. Implementing a corrosion control system can prevent lead from mobilizing from pipes into water. To ensure corrosion control systems work, the EPA has set an “Action Level” for lead in drinking water. PWSs are required to sample several taps within the distribution system for lead and copper. As long as no more than 10% of samples do not exceed 15 ppb of lead and 1.3 ppm for copper, the system is in compliance. On January 15, 2021, the EPA promulgated the revised LCR, or LCRR, which required PWSs to develop a lead service line inventory, notify end-users if they are potentially serviced by a lead service line, notify the public of exceedances, and fulfill regulatory reporting requirements.

Maynard had a history of Action Level Exceedances (ALEs) for lead. Following an exceedance in the third quarter of 2022, per local regulatory requirements, an optimized corrosion control treatment study was performed in 2023, and a corrosion control system was subsequently designed and constructed. The system, which was brought online in June of 2025, involves dosing orthophosphate at all three plants alongside pH control to maintain the effectiveness of the chemical addition. The corrosion control system has resolved the ALEs and must continue to be an integral part of any system upgrades or changes that need to occur.

Figure 2-5. DBP Sampling Locations.

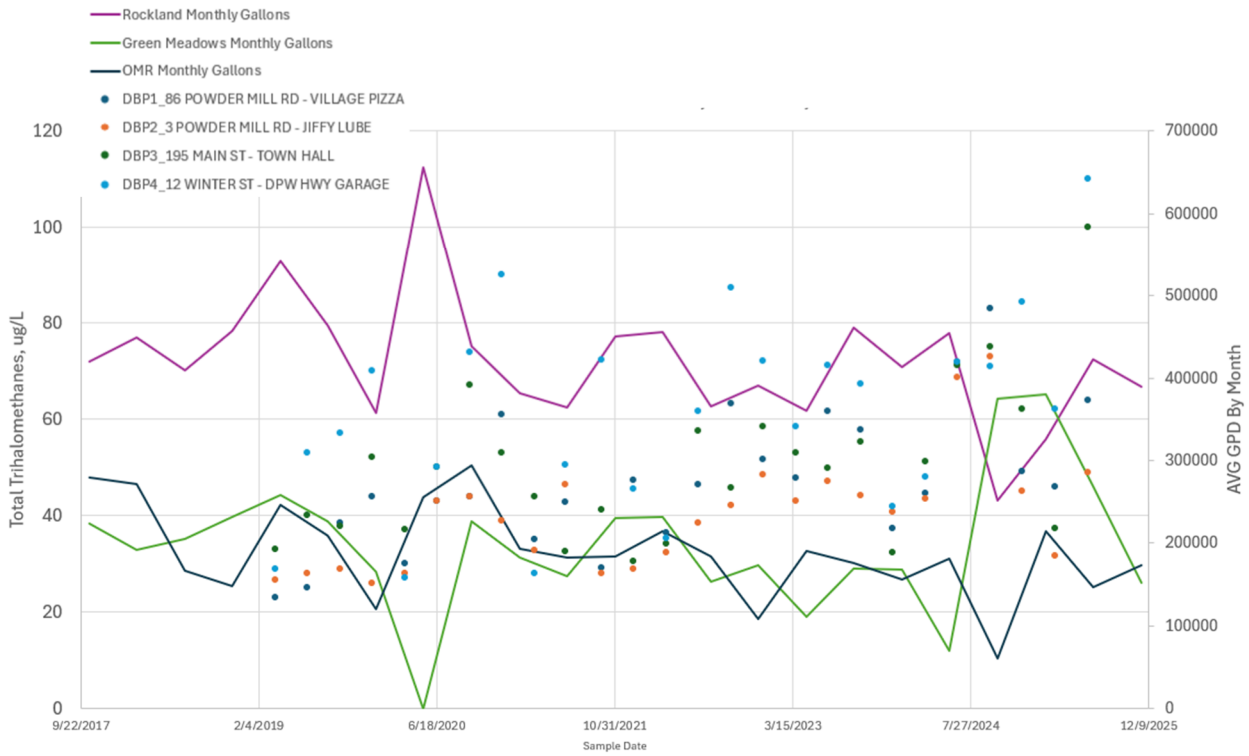


Figure 2-6. Distribution System Total Trihalomethane (TTHM4) Concentration.

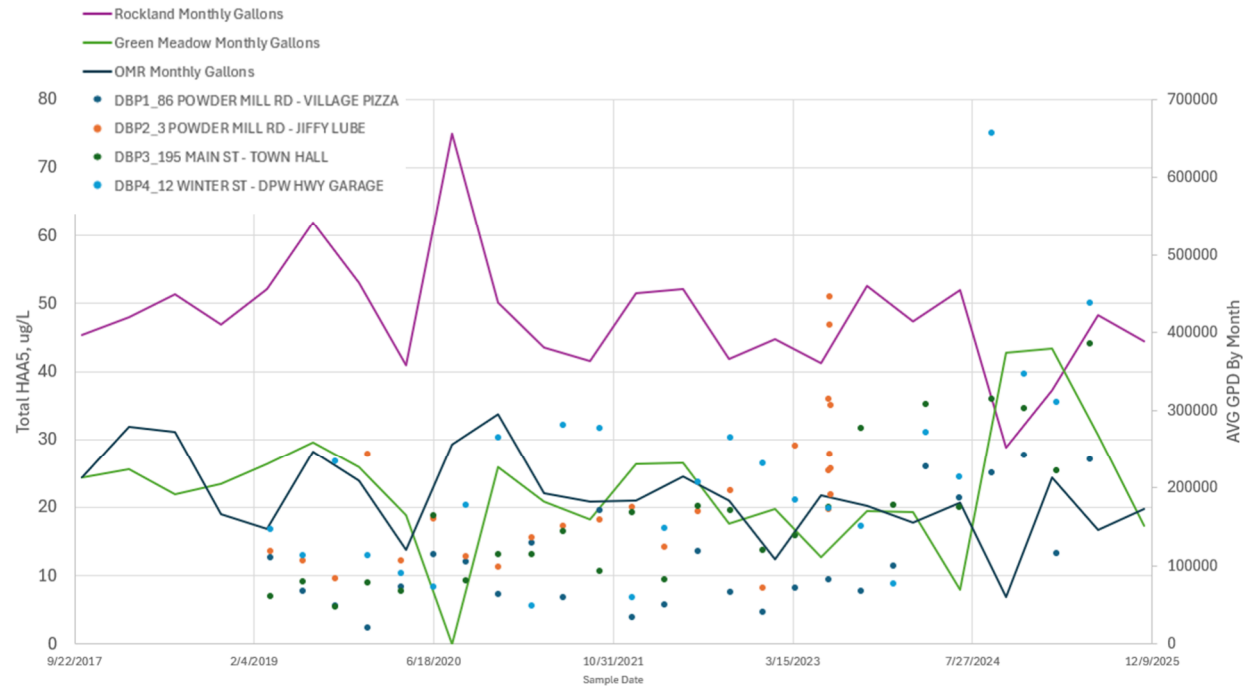


Figure 2-7. Distribution System Haloacetic Acid (HAA5) Concentration.

2.2.2 National Secondary Drinking Water Standards

The EPA has also established National Secondary Drinking Water Standards that set non-enforceable water quality standards as Secondary Maximum Contaminant Levels (SMCLs). These SMCLs serve as guidelines to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. The contaminants are not considered to pose a human health risk at the SMCL.

Iron and manganese are two such secondary constituents that are prevalent in raw water in Maynard. The SMCL has been established at 0.3 mg/L for iron and 0.05 mg/L for manganese. As shown in Table 2-4, iron and manganese SMCLs are exceeded in raw water at each site, and concentrations are often higher than practical for the existing GreensandPlus™ filters to treat without frequent backwashing or risking water quality breakthrough in the filter effluent. Recall that wells are not operated at full capacity – and Well 03-G has been taken entirely offline – due to raw water quality issues resulting in operational challenges. Therefore, the raw water iron and manganese concentrations are expected to be higher when wells are pumped to their full potential, which will be necessary to meet the Town's future demands.

Table 2-4. Iron and Manganese Concentrations in Groundwater.

		OMR Wellfield[1]				Green Meadow Wellfield				Rockland Wellfield[2]	
		01/A-G (mg/L)		03-G (mg/L)		04G (mg/L)		08G (mg/L)		Blended Raw (mg/L)	
Analyte	Secondary MCL (mg/L)	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG	MAX	AVG
Iron	0.3	**40.0**	**8.03**	**26.0**	**18.7**	**11.3**	**7.5**	0.004	0.004	**7.01**	**5.76**
Manganese	0.05	**1.2**	**1.0**	**1.3**	**1.0**	**0.7**	**0.5**	0.010	0.010	**1.13**	**0.61**

Notes: Data from Energy & Environmental Affairs Data Portal (2019-2024).
1. Blended raw water quality is reported for OMR wells 01-G and 01A-G. Well 03-G data is available in 2022 only.
2. Individual samples from 05G, 06G, and 07G were not reported in the E&EA Data Portal.
Bold indicates exceedance of SMCL.

2.2.3 Office of Research and Standards Guideline for Manganese

The Massachusetts Office of Research and Standards sets guidelines (ORSG) for manganese in drinking water, based closely on US EPA health advisory levels for manganese. The lifetime ORSG, or "a reasonable value for consumption of water from public drinking water supplies" over the long term, is 0.3 mg/L for manganese for the general population. As shown in Table 2-4, all wells except Well 08G exceed the lifetime ORSG for manganese for the general population. The ORSG for 10-day exposure for the general population is 1.0 mg/L, which is exceeded for all OMR wells and Rockland Avenue blended water. The ORSG for infants or children less than one year of age, is a maximum of 0.3 mg/L of manganese for no more than more than ten days.

2.2.4 Future Compliance Considerations

2.2.4.1 EPA's Third Six-Year Review

The Safe Drinking Water Act (SDWA) requires the EPA to review each NPDWR at least once every six years and revise them if deemed appropriate. In January 2017, the EPA announced the results of its third six-year review, which identified eight NPDWRs as candidates for revision. Among these eight, four are of relevance to Maynard based on known contamination issues: haloacetic acids, *Giardia lamblia*, TTHMs, and viruses. The revisions under consideration[2] would affect the microbial disinfection and disinfection byproducts (MDBP) rules, with proposed changes anticipated to be announced Summer of 2027.

A critical potential revision involves the reclassification of groundwater under the direct influence (GWUDI) of surface water. The criteria for GWUDI classification may be expanded to more indicators such as elevated total organic carbon (TOC). This reclassification would result in additional treatment and disinfection requirements to meet compliance relevant for treatment of surface waters. Currently, no well in service at Maynard is classified as GWUDI; however, raw water TOC levels are high, consistently above 1 mg/L on average throughout the system, as summarized in Table 2-5. Additionally, microscopic particulate analysis for Well 8 blended raw water conducted in the spring of 2025 found that the wells are in the "moderate risk range" for being under the influence of surface water. Should reclassification occur, the key treatment upgrades required would include 4-log virus inactivation, 3-log giardia removal, and 2-log cryptosporidium removal for systems that filter.

Table 2-5. Summary of TOC Concentrations in Raw Groundwater.

	OMR		Green Meadow		Rockland[1]	
Concentration (mg/L)	MAX	AVG	MAX	AVG	MAX	AVG
TOC	17	3.2	4.5	2.1	3.9	2.8

Notes: Data from Energy & Environmental Affairs Data Portal (2016-2025).
1. Maximums and averages determined based on analysis of both of individual and blended well samples. Only data for Well #3 was available in the portal for Rockland Avenue. Sampling dates for Rockland Avenue Well #3 TOC included the years 2017-2019.

Possible rule revisions also consider the regulation of DBPs of emerging concern. Haloacetic acids and chloromethane, which were both part of a past Unregulated Contaminants Monitoring Rule (UCMR) campaign as described in more detail in 2.2.4.2 below, have recently gained greater scrutiny for their water toxicity based on recent toxicology research and may be regulated in the future. Recommended revisions to the rule also include multi-benefit precursor control, meaning PWSs may be required to reduce DBP formation and disinfectant demand. Accordingly, it will be beneficial for future water

[2] National Drinking Water Advisory Council. November 2023 Report of the Microbial and Disinfection Byproducts Rule Revisions Working Group. https://www.epa.gov/system/files/documents/2023-12/report-of-the-mdbp-rule-revisions-working-group-to-the-ndwac-november-2023-1.pdf

treatment modifications to provide some degree of removal of DPB precursors, such as TOC, which react with disinfectants to form DBPs.

2.2.4.2 Unregulated Contaminants Monitoring Rule

The Town has participated in sampling campaigns for the UCMR. The central goal of UCMR sampling is to assess the occurrence of emerging contaminants on a nationwide scale. Emerging contaminants on UCMR lists are not regulated by the NPDWR but may be evaluated for regulation in the future. The discussion below summarizes the results of sampling the Town participated in for UCMR3, UCMR4, and UCMR5.

UCMR 3 and 4 Contaminants

Sampling results from UCMR3 (2013-2015) and UCMR4 (2018-2020) in Maynard shows the presence of a variety of DPBs, inorganic compounds, and chloromethane in finished water, as shown in Table 2-6.

Table 2-6. UCMR 3 and 4 Sampling Results.

Contaminant	UCMR Campaign	Contaminant Category	Concentration			Sample Point
			Minimum	Maximum	Average	
HAA5 (ug/L)	UCMR 4 (2018-2020)	DBP	2.5	38.9	13.7	DS
HAA6Br (ug/L)		DBP	1.21	10.8	5.8	DS
HAA9 (ug/L)		DBP	3.71	48.9	19.1	DS
Manganese (mg/L)		inorganic	0.0006	0.247	0.0682	EP
Molybdenum (ug/L)	UCMR 3 (2013 - 2015)	inorganic	ND	1.4	0.43	EP
			ND	1.3	0.42	DS
Strontium (ug/L)		inorganic	69.5	344	218	DS
			67	338	176	EP
Chromium-6 (ug/L)		inorganic	ND	0.046	0.015	EP
			ND	0.06	0.018	DS
Chromium (ug/L)		inorganic	ND	0.90	0.36	EP
			0.35	0.35	0.35	DS
Chlorate (ug/L)		inorganic, DBP	415	1800	883	EP
			418	1830	813	DS
Chloromethane (ug/L)		organic	ND	0.79	0.33	EP

Note: Concentrations shown are based on collective sampling across all distribution system entry points (OMR, Rockland, Green Meadow) or distribution system sampling locations (DBP1 through DBP4).
DS – Distribution system
EP – Entry point to distribution system

Haloacetic Acids

Three groups of haloacetic acids (HAA5, HAA6Br, HAA9) must be considered as part of possible future DBP regulation changes. HAA5 is a group of chlorinated haloacetic acids that are currently regulated based on a locational running average concentration within the distribution system. Brominated DBPs are more toxic than their chlorinated counterparts and form as a result of background bromide in groundwater that additionally contains free chlorine and total organic carbon. HAA6Br consist of six such haloacetic acids that are brominated. HAA9 consists of HAA5 compounds in addition to four brominated haloacetic acids. The complete list of haloacetic acids that make up HAA5, HAA6Br, and HAA9 are given in Table 2-7. Based on available UCMR data, the ratio of HAA9/HAA5 values for the Town's distribution system generally ranged from 1.3 to 1.7, as given in Appendix E. Since HAA5 has historically reached above 40 ug/L, it is possible for the HAA9 to reach 40 x 1.7 = 68 ug/L. The current HAA5 compound class MCL is 60 µg/L by LRAA. Although there is no information available on how HAA9 may be regulated in the future, if we were to assume that as a result of the UCMR4 data, an HAA9 MLC of 60 µg/L were established, this could pose problems for the Town. The brominated (most toxic) haloacetic acid fraction of HAA9 is typically between 22 and 40% (Appendix E), which is denoted as HAA6Br in Table 2-4. Due to its toxicity, it can be reasonably expected that if an MCL for HAA6Br were to be established in the future it could be less than the current 60 µg/L LRAA for HAA5.

In addition to being a part of the UCMR4 campaign, haloacetic acids are under evaluation for regulation changes as part of the EPA's six-year review of NDPWRs. It is impossible to predict the future of drinking water federal regulations, but it is important to note that there is potential for these compounds to be regulated in the future and they are present in the Town's drinking water. This emphasizes the importance of reducing DBP precursors (i.e., organics) as much as possible to not only meet current DBP regulations but potential future ones.

Table 2-7. HAA5 and HAA9 Compounds

Compound Name	HAA5	HAA6Br	HAA9
Chlorinated HAAs			
Monochloroacetic acid (MCAA)	✓	×	✓
Dichloroacetic acid (DCAA)	✓	×	✓
Trichloroacetic acid (TCAA)	✓	×	✓
Brominated HAAs			
Monobromoacetic acid (TCAA)	✓	✓	✓
Dibromoacetic acid (DBAA)	✓	✓	✓
Tribromoacetic acid (TBAA)	×	✓	✓
Bromochloroacetic acid (BCAA)	×	✓	✓
Bromodichloroacetic acid (BDCAA)	×	✓	✓
Chlorodibromoacetic Acid (CDBAA)	×	✓	✓

Manganese

There are currently exceedances of the manganese SMCL, the manganese MassDEP ORSG, and US EPA HA in the Town's raw water. Manganese is currently removed through the existing GreensandPlus™ filters at each of the Town's WTPs. A detailed discussion of manganese in finished water is given for each WTP in Section 3.0. Removal of manganese from the Town's well sources will continue to be important if manganese were to be regulated with a primary MCL. As long as the Town maintains compliance with the manganese SMCL, there is little risk in future primary MCL exceedances because it is anticipated that a future manganese MCL would be higher than the current SMCL.

Inorganics

There are several inorganics that have been identified in the Town's drinking water in the past UCMR campaigns that can be removed by media that are also used to treat PFAS. Specifically, strontium, molybdenum, chlorate, chromium, and chromium-6 can be removed using ion exchange (IX) media, among other treatment technologies.

Chloromethane

Chloromethane is an organic compound on the UCMR4 that was detected in the Town's water. It can be removed via granular activated carbon (GAC) and air stripping.

UCMR5 Contaminants

The UCMR5 sampling round, to occur between 2023 and 2025, includes 29 PFAS compounds as well as lithium. As part of the UCMR5 sampling to date, lithium was not detected in any of the samples taken. Out of the 29 PFAS compounds included on the list, Maynard had detections for five compounds, three of which (PFOA, PFOS, and PFBS) are regulated as of 2024. A summary of PFAS compound detections for UCMR5 sampling rounds only is given in Table 2-8. A summary of regulated PFAS compound detections in finished water is discussed for each WTP in Section 2.2.1.1.

Table 2-8. UCMR5 Detections in Finished Water for PFAS Compounds (2023 - 2024).

Contaminant	Concentration (ppt)		
	Minimum	Maximum	Average
PFBS	ND	3.1	0.5
PFHxA	ND	4	1.3
PFOA	ND	7.1	2.0
PFOS	ND	4.2	0.7
PFPeA	ND	3.7	1.2

Note: PFOA, PFOS, and PFBS are now regulated compounds. Concentrations shown do not include results outside of UCMR sampling and are based on collective sampling across all distribution system entry points (OMR, Rockland, Green Meadow).

While it is not advisable to upgrade treatment plants to specifically treat contaminants identified during UCMR sampling, it will be important when evaluating new treatment technologies to be included in future WTP upgrades to consider the ability of the proposed processes to potentially provide multiple benefits for treatment in the future.

3.0 REQUIRED TREATMENT PLANT IMPROVEMENTS

3.1 OLD MARLBORO ROAD WTP

The OMR WTP is a 1.08 MGD iron and manganese treatment facility that utilizes potassium permanganate ($KMnO_4$) as a pre-oxidant and potassium hydroxide (KOH) for pH adjustment, followed by GreensandPlus™ filtration. pH is then adjusted again (as needed) with KOH, and sodium hypochlorite (NaOCl) is added for disinfection. Orthophosphate is the last chemical added and provides corrosion control. Backwash water for the GreensandPlus ™ filters is sourced from the plant's finished water pipeline, and backwash waste is sent to the sewer system. Figure 3-1 shows the OMR WTP process flow diagram. The facility currently does not comply with 4-log virus inactivation.

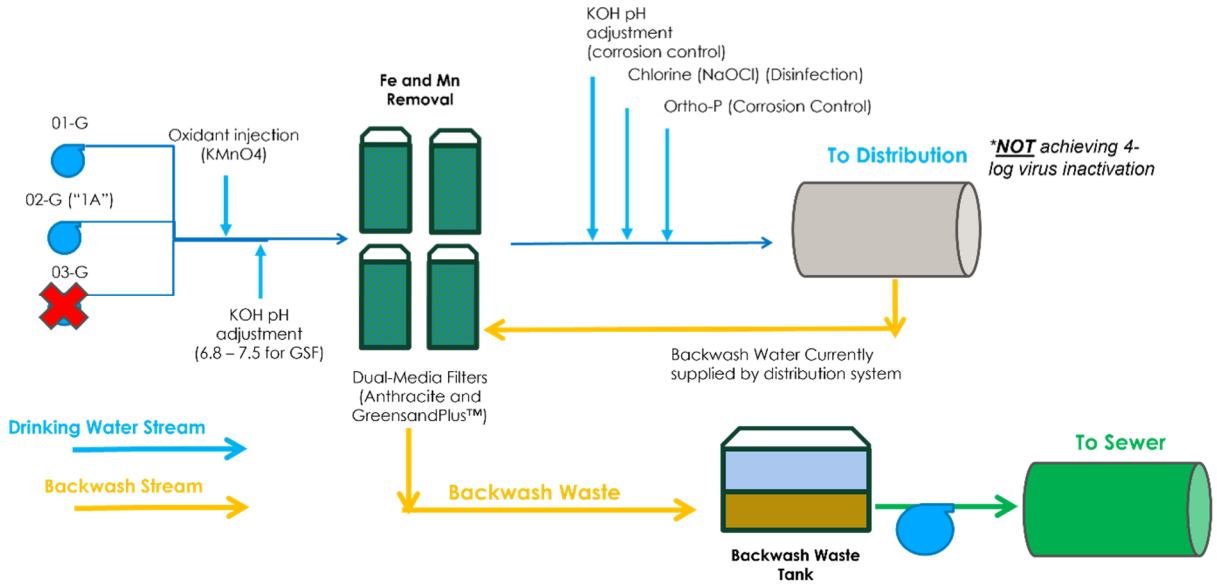


Figure 3-1. OMR WTP Process Flow Diagram.

Necessary improvements to the OMR WTP include PFAS treatment due to raw and finished water PFAS concentrations that exceed MCLs, as described in Section 2.2.1.1. As summarized in Table 3-1, iron and manganese in finished water meet SMCLs on average, but there are some exceedances. It is important to recall that raw water manganese exceeds the US EPA HA and the MassDEP ORSG, and it has been part of past UCMRs suggesting an enforceable regulation may be forthcoming. Additionally, PFAS treatment processes require pretreatment for iron, manganese, and organics if they are present at high levels to ensure PFAS treatment capacity is maintained and to prolong the life of the PFAS treatment media. Therefore, modifications to improve iron and manganese removal must be considered. Additionally, treatment must be implemented to reduce the TOC that persists from source water (Table 2-5) to finished water (Table 3-1) to address elevated levels of DBPs in the distribution system. Note that the concentrations shown in Table 3-1 do not include raw water from OMR Well #3, which demonstrated even worse water quality before it was shut down.

Table 3-1. OMR Finished Water Quality.

Constituent	SMCL	Concentration (mg/L)	
		Maximum	Average
TOC[1]	N/A	2.46	1.87
Iron[2]	0.3	0.50	0.02
Manganese[2]	0.05	0.12	0.02

1. TOC data from 2022 - 2024 quarterly reporting.
2. Fe and Mn data from Energy & Environmental Affairs Data Portal (2019-2024).

4-log virus inactivation will be implemented at this site to ensure reliable compliance with the TCR,. A clearwell is recommended for OMR's proposed upgrades for the dual benefit of storing backwash supply

water to minimize stress on the finished water supply in the distribution system, and also to provide the necessary contact time to achieve 4-log virus inactivation.

3.1.1 OMR WTP Condition Assessment

An assessment of the OMR WTP was completed to identify necessary improvements, unrelated to treatment process upgrades required for regulatory compliance, to be included in the next OMR WTP Upgrade project. The chemical systems at the OMR WTP must be updated. Currently the chemical fill stations are in a common lockbox. Separate enclosures should be constructed for chemical fill stations, and exterior fill panels with level indicators for the bulk tanks should be provided. The system must include appropriate strobes and alarms. A flow switch is needed to turn the raw water well pumps off when the chemical pump stops. The chemical system and main control panel PLC must be upgraded accordingly. Necessary replacements include a new NaOCl bulk tank and some sections of pipe. Chemical pumps also require further evaluation and may need to be replaced.

Other general facility improvements also need to be undertaken at OMR. Pipe supports and unistruts for filter instruments are corroded and must be replaced in-kind. Backwash waste tank hatches, manholes, and valve boxes need to be reset and fixed. The office and laboratory floor must be replaced. New LED lighting is required. Emergency lighting is not sufficiently spaced and must be corrected. HVAC equipment and control upgrades are required. At 30 years old, the generator and automatic transfer switch cabinet must be replaced. Electrical equipment needs to be labeled according to National Electric Code.

Several exterior and interior structural improvements are recommended. There is widespread cracking of CMU throughout the facility, which requires further evaluation. Cracks in CMU should be repaired and cutting in new control joints should be evaluated. Weeps and vents are required in the face wythe on the exterior. Sealant must be removed and replaced at masonry control joints, door and louver opening perimeter joints, wall control joints, and concrete slab expansion joints. The roof has not been replaced since the building was constructed; it should be removed and replaced along with flashing assemblies down to the roof deck. Deteriorated sealant at joints should be removed and replaced between precast concrete roof planks. Exterior doors, frames, and hardware are due for replacement. New floor coating should be provided on floor slabs in the filter room, chemical room, and mechanical and electrical room, and the VCT flooring in the laboratory should be replaced.

The access road requires improvements to make it easier for chemical delivery trucks to access the site and to address its tendency to flood. The overhead electrical lines run through the wetlands and are difficult to service in the event of an outage, which could lead to prolonged WTP shutdowns.

It is important to note, as discussed below in Section 4.4, combining the OMR and Green Meadows sources for treatment at a single new WTP may be warranted, making these OMR WTP improvement recommendations irrelevant. Additionally, a separate OMR Treatment Feasibility Study is being developed which explores a variety of treatment train alternatives that do not utilize the existing Greensand Plus filters since they are inadequate to address the current levels of iron and manganese in

raw water. If the Treatment Feasibility Study determines that an entirely new plant must be constructed for treatment of the OMR wells, the above identified repairs will not be necessary.

3.2 GREEN MEADOW WTP

The Green Meadow WTP (formerly Well 4 WTP) is a 0.648 MGD iron and manganese treatment facility that uses NaOCl as a pre-oxidant and KOH for pH adjustment, followed by Greensand Plus filters, KOH again for pH adjustment (as needed), and NaOCl for disinfection. Finally, orthophosphate is added for corrosion control. The facility currently complies with 4-log virus removal via contact time with chlorine in the length of transmission main that runs from the point of chlorine injection to the distribution system right before the first customer (Green Meadow School). Backwash water for the Greensand Plus filters is primarily sourced from the plant's Backwash Supply Tank and supplemented from finished water in the distribution system, and backwash waste is sent to the backwash waste holding tank where it can be recycled to the front of the plant or sent to lagoons for settling and eventual solids removal. Figure 3-2 below shows the Green Meadow WTP process flow diagram.

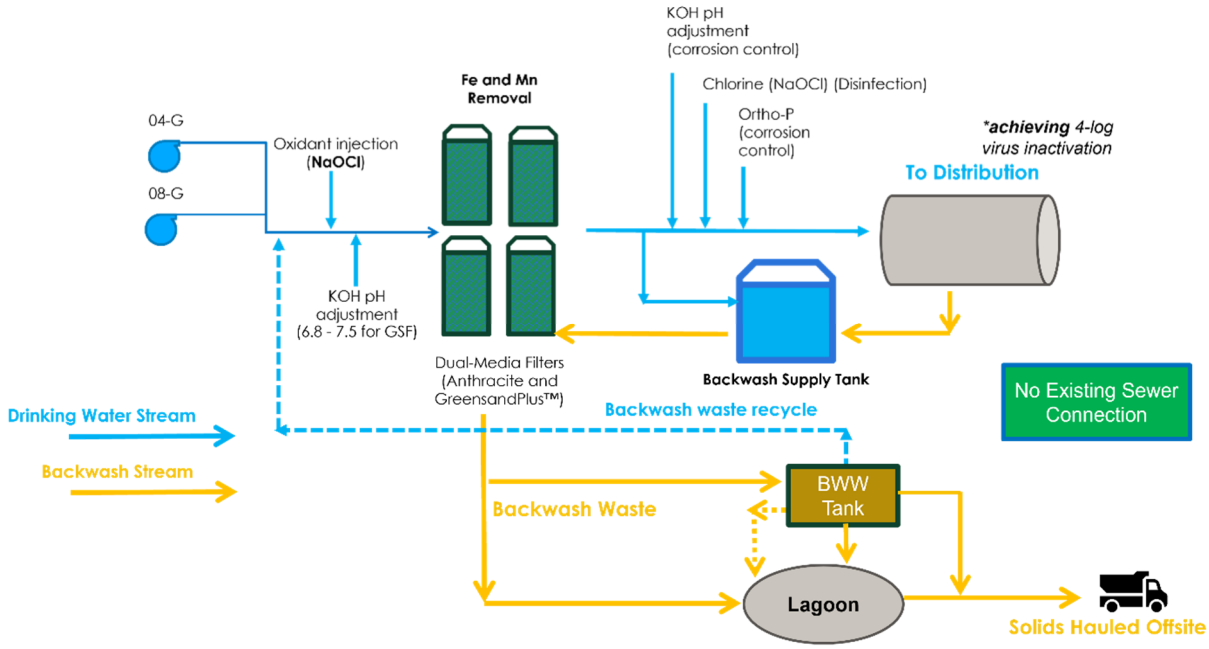


Figure 3-2. Green Meadow WTP Process Flow Diagram.

As mentioned in Section 2.2.1.1, there is PFAS in the groundwater and WTP effluent at this site, which must be treated to be in compliance with the new PFAS MCLs. Also, as shown in Table 3-2, the SMCL for iron and manganese are met on average in finished water, although, despite filtration, individual exceedances of manganese are as high as 0.61 mg/L. Observed spikes of manganese in finished water violate the MassDEP OSRG and EPA HA.

Table 3-2. Green Meadow Finished Water Quality.

Constituent	SMCL	Concentration (mg/L)	
		Maximum	Average
TOC	N/A	2.65	0.95
Iron	0.3	0.07	0.03
Manganese	0.05	0.61	0.03

1. TOC data from 2022 – 2024 quarterly sampling.
2. Fe and Mn data as reported in the Energy & Environmental Affairs Data Portal (2019-2024).

Finished water TOC is observed to be as high as 2.65 mg/L and must be addressed to reduce formation of distribution system DBPs. The facility's capacity was increased in April 2024 through the construction of one well field (Well 08G), an additional GreensandPlus™ filter vessel, and an associated backwash waste tank. The addition of Well 08G has increased the TOC levels in the finished water. The Town has conducted jar testing of Green Meadows water and concluded that changing the sodium hypochlorite oxidant to potassium permanganate may result in some reduction of DBPs in the interim. The Town will be implementing this change immediately.

3.2.1 Green Meadow WTP Condition Assessment

An assessment of the Green Meadow WTP was completed to identify necessary improvements, unrelated to treatment process upgrades required for regulatory compliance. The facility was upgraded in 2024 and thus, no other significant upgrades of note are required at Green Meadow. Minor HVAC updates are recommended. For code compliance, a concrete walkway from the door to the parking lot is required. Improvements to the operations of the backwash recycling system should be evaluated based on recent reported issues with poor settling in the backwash waste tank resulting in a backwash recycle stream with extremely high levels of iron and manganese.

3.3 ROCKLAND AVENUE WTP

The Rockland Avenue WTP is the largest water treatment plant servicing the Town of Maynard. This 1.44 MGD facility is operated as an iron and manganese treatment plant that utilizes KMnO4 as a pre-oxidant An aeration tower is also installed for the dual benefit of radionuclides removal and pH adjustment through CO_2 stripping. 4-log disinfection is not currently achieved at this site. The process flow diagram for the Rockland Avenue WTP is shown in Figure 3-3 below.

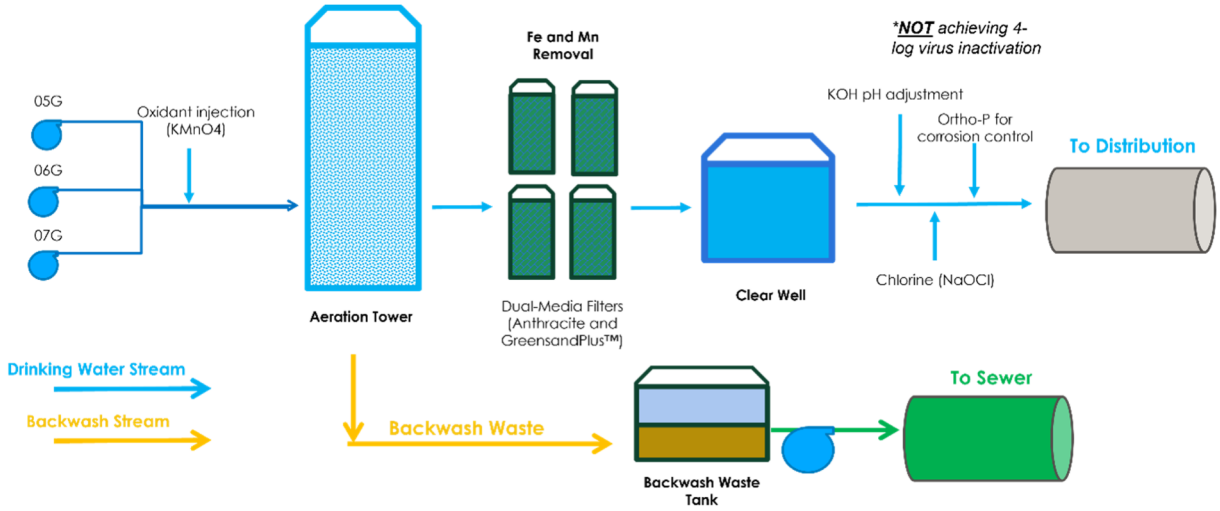


Figure 3-3. Rockland Avenue WTP Process Flow Diagram.

As described in Section 2.2.1.1, there is PFAS in the groundwater and WTP finished water at this site which must be treated. The average iron and manganese SMCLs are met, with occasional instantaneous exceedances of iron. Finished water TOC was as high as 1.19 mg/L. Finished water quality parameters are summarized in Table 3-3.

Table 3-3. Rockland Finished Water Quality.

Constituent	SMCL	Concentration (mg/L)	
		Maximum	Average
TOC	N/A	1.19	0.92
Iron	0.3	0.44	0.02
Manganese	0.05	0.03	0.01

1. TOC data from 2022 - 2024 quarterly reporting.
2. Fe and Mn data as reported in the Energy & Environmental Affairs Data Portal (2019-2024).

3.3.1 Rockland Avenue WTP Condition Assessment

An assessment of the Rockland Avenue WTP was completed to identify necessary improvements, unrelated to treatment process upgrades required for regulatory compliance, to be included in the next Rockland Avenue WTP Upgrade project. This is an aging facility that will require upgrades soon. Several components of the pipes, pumps, fittings, and pipe supports are worn, corroded, or otherwise need replacement. The chemical feed system will need to be upgraded, including bulk tanks, transfer pumps, and metering pumps. New pH and chlorine residual instrumentation are needed, as well as new flow meters and analyzer piping and tubing. Orifice flow meters should be upgraded to Mag Meters with appropriate straight runs. If filter vessels are not replaced as part of WTP upgrades, they must be cleaned and likely recoated at minimum. Tanks must be cleaned. Filter media should be replaced. The aeration tower media needs to be replaced. The blower requires a soft start and a properly screened intake. The

hydropneumatic tank needs to be replaced. The gate valves on the new wells need replacing and new check valves are desired. The wells need to be cleaned and redeveloped. The E/One grinder pump station is due for upgrades.

HVAC equipment must be upgraded along with HVAC controls. New LED lighting is required. The facility regularly loses normal power for multiple reasons. Downed trees on upstream overhead utility lines are sometimes the cause due to the station being located on a wooded unpaved road. The facility main circuit breaker also trips regularly due to undetermined abnormalities or miscoordination of the facility electrical distribution system. Electrical upgrades are required to meet building code, and the facility needs a new generator.

The roof needs to be replaced, as well as the vinyl siding in gable end walls and dormers, and the flooring in the office. CMU exterior and interior wall cracks need repair. The Town requires a paved area for vacuum excavator truck access.

4.0 WATER DEMAND

From 2017 to 2024, the highest observed average day demand (ADD) was 0.75 MGD in 2020, and the highest maximum day demand (MDD) was 1.81 MGD in 2021. As Table 2-1 shows, the total rated pumping capacity of the Town's wells is 3.673 MGD. However, there are several limitations to the amount of water that can be produced at any site, including raw water quality challenges, drought, and permit conditions in place to protect environmental resources. Additionally, the Town would like to be able to meet the MDD when the largest well is out of service or the largest WTP is out of service. Meeting the MDD and redundancy goals will get harder to achieve as demands increase in the future.

To develop a road map for system upgrades including capacity building, the water demands need to be established at the 20-year (2045) and 50-year (2075) planning horizons. The next 20 years of water demands can be specifically defined based on the known planned developments that will increase the number of residences and commercial space within the Town. Beyond 20 years, when it is difficult to characterize the type of development that will occur, a typical population projection can be used to establish future water demand.

4.1 2045 AVERAGE DAY DEMAND

The main determinant of the 20-year average day water demand (ADD) will be known residential and commercial growth. There are nine major developments, as shown in Table 4-1, that are expected to be completed by 2045. As of the end of 2024, the 129 Parker Street development had 100% residential occupancy and 90% commercial occupancy. Thus, only 10% of the unoccupied commercial space at this development can be attributed to future expected water demand. The remainder of the developments all represent new water demand to be added to the system.

State environmental code 310 CMR 15.000 Title 5 establishes design sewer flows per residential bedroom, square foot of commercial space, and other criteria. Water use for each development can thereby be determined by assuming that sewer use is a typical 90% of water use.

The Town currently reviews and approves developers' plans for drinking water and sewer requirements. Table 4-1 summarizes the estimated water demands for the currently planned developments (as of December 2024), which are generally based on Title 5 guidelines or a prior Town approval where otherwise appropriate. The total residential water use attributable to the planned developments is expected to be 108.1 million gallons per year (MGY); the total commercial water use will be 0.7 MGY; and the total new water use for all developments will be 108.8 MGY, or 0.30 MGD. Future average day water demands estimated from planned developments represent a 41% increase in overall water use from 2024.

Table 4-1. Town of Maynard Planned Developments.

Development	Residential (MGY)	Commercial (MGY)	Total (MGY)
Waltham St. Powder Mill Road (2-6 Powder Mill Road)	2.4	0.1	2.5
Maynard Crossing (129 Parker Street)	0.0	0.6	0.6
Maynard Square (115 Main Street)	2.7	0.0	2.8
12 Bancroft Civico (12 Bancroft Street)	0.7	0.0	0.7
MBTA Zoning Area Development (111 Powder Mill Road)	49.7	0.0	49.7
Mill & Main Multifamily Building (Main/Sudbury Street)	12.5	0.0	12.5
Mill & Main Currently Undeveloped Buildings (Mill Campus)	22.3	0.0	22.3
Fowler School Redevelopment (61-63 Summer Street)	2.6	0.0	2.6
Maynard Kanso 40B (182 Parker Street)	15.2	0.0	15.2
TOTAL	**108.1**	**0.7**	**108.8**

In addition to residential and commercial water use, industrial demands, municipal/institutional/non-profit demands, Confidently Estimated Municipal Use (CEMU), and Unaccounted-for Water (UAW) must be considered. CEMU is water used for purposes such as fire protection, hydrant flushing, bleeders/blow offs, source meter calibration adjustments, construction uses, and major watermain breaks. Unaccounted-for water (UAW) typically consists of unmetered water usage such as leaks or water theft.

The typical fraction of each water use type is tracked in the Town's Annual Statistical Reports (ASRs), as summarized in Table 4-2. Industrial water use increased significantly in 2023 due to corrected water meter readings. UAW has been greater than 16% between 2019 and 2022, though Maynard's Water Management Act registration requires UAW to be 10% or lower. As of 2023, the Town has undertaken efforts to address this UAW and has since been achieving this target value.

All water use types are expected to grow as the water supply system grows. For future projections, Stantec assumed the fixed percentages shown in Table 4-2 of each use type based on historical percentages and known changes to the water system that are reflected in more recent years. Additionally, 10% UAW, the maximum allowed by the Town's Water Management Act registration, is conservatively assumed.

Table 4-2. Fraction of Water Demand by Use Type.

Year	Residential	Commercial/ Business	Industrial	Municipal/Institutional/ Non-profits	CEMU	UAW
2020	76.9%	1.4%	0.4%	2.5%	2.0%	16.7%
2021	64.4%	3.0%	1.9%	12.3%	1.6%	16.6%
2022*	64.4%	3.0%	1.9%	12.3%	1.6%	16.6%
2023	73.4%	4.0%	7.4%	8.5%	2.7%	4.0%
2024	65.2%	5.5%	5.5%	8.2%	6.1%	9.5%
Future	70.0%	3.3%	6.9%	7.8%	2.0%	10.0%

*0.2% demand attributed to "Other"

Knowing the residential use in 2024 was 175.2 MGY, and an additional 108.1 MGY in new residential use is expected from developments by 2045, the total expected residential water use at the end of the 20-year planning horizon is 283.3 MGY. Assuming an additional 2% growth to account for unknowns over 20 years results in 289.0 MGY of residential use in 2045 for planning purposes. Using known 2024 water use by type, the projected 2045 water use for industrial, institutional, CEMU, and UAW types can be determined by applying the fixed percentages to the 2045 projected water residential use, as shown in Table 4-3. Using this method, the total water use in 2045 is expected to be 404.5 MGY, or 1.11 MGD. This is higher than the average annual withdrawal limit of 1.09 MGD that the Town is permitted to utilize collectively from all water sources.

Table 4-3. Expected 2045 Water Demand by Type in 2045.

Year	Total Water Use (MGY)	Residential (MGY)	Commercial/ Business (MGY)	Industrial (MGY)
2024	268.7	175.2	14.8	14.8
2045	404.5	285.5	10.5	28.1
Year	**Municipal/Institutional/ Non-Profits (MGY)**		**CEMU (MGY)**	**UAW (MGY)**
2024	22.0		16.3	25.6
2045	31.8		8.2	40.5

4.2 2075 AVERAGE DAY DEMAND

Water demand projections completed from present day to 2045 are driven by future water use of new developments in town. Since development projections become increasingly uncertain after 2045, population projections can provide the basis for projecting future water demands and assessing system needs. Maynard exhibits growth patterns similar to what was seen in Waltham, also a commuter city outside of Boston, 20-years ago. The average annual population increase from 2002 to 2023 in Waltham was 0.44%. We can reasonably assume this population growth rate can be applied to Maynard from 2045-2075.

The Massachusetts Department of Environmental Protection, (MassDEP) has set a compliance standard of 65 residential gallons per capita per day (RGPCD) of water usage as a conservation measure. Therefore, for every new resident in town, the water department should plan to supply an upper limit of 65 RGPCD. Knowing the future water usage will grow in direct proportion to the population, 0.44% annual growth over 30 years results in a total residential water usage of 326.1 MGY. Applying fixed percentages to each water use type per Table 4-2, the total water use in 2075 comes out to 465.8 MGY, or 1.28 MGD.

4.3 MAXIMUM DAY DEMANDS

The maximum day demand (MDD) is the largest volume of water used over a single 24-hour period. Future MDD can be calculated by using a typical “peaking factor” or ratio between the ADD and the MDD. From 2017 to 2024, the average observed peaking factor was 1.81. Using this ratio moving forward, the 2045 MDD is expected to be 2.01 MGD and the 2075 MDD is expected to be 2.31 MGD, as summarized in Table 4-4. The overall ADD and MDD projections over time, extended from historical data, is shown in Figure 4-1.

Table 4-4. Projected Average and Maximum Day Demands

Demand Type	2024	2045	2075
Average Day	0.74	1.11	1.28
Maximum Day	1.43	2.01	2.31

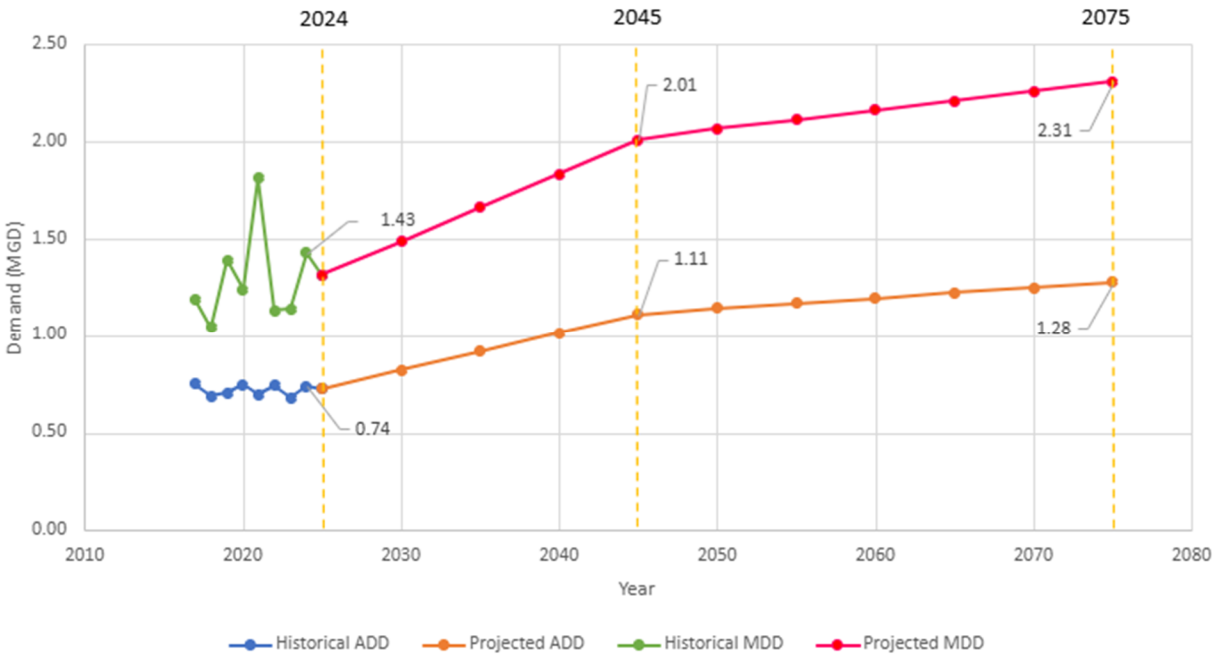


Figure 4-1. Historical and Projected Average and Maximum Day Demands

4.4 RESILIENCY AND REDUNDANCY

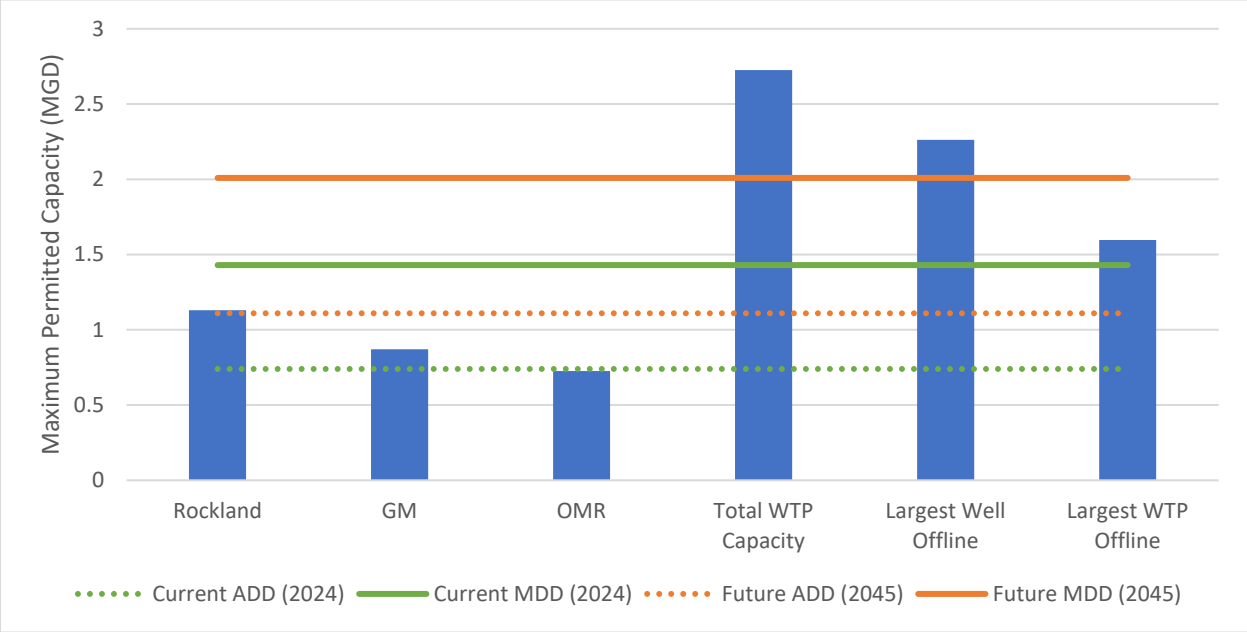
The Ten State Standards for Water Works recommends that groundwater source capacity equal or exceed the design MDD with the largest producing well out of service. The Town wishes to go beyond this standard by being able to meet the MDD with the largest WTP out of service. Historically, WTPs in Maynard have been taken out of service for extended periods due to failures and maintenance, limiting the Town's ability to meet demands. Upgrades requiring longer-term shut downs will be required for regulatory compliance at each WTP in the near future. As such, it is important that the Town build in the added redundancy in source water capacity and treatment to be able to meet the increasing MDD and to have resiliency in the face of anticipated and unanticipated extended service outages.

Figure 4-2 shows the permitted capacity of each wellfield compared to current and future ADD and MDD. Assuming the Town operates each well to full capacity, the current MDD can be met with the largest WTP offline, albeit with little leeway. The future MDD cannot be met with the largest WTP offline, but can be met with the largest producing well out of service. Nevertheless, due to drought and decreasing raw water quality, the Town cannot utilize the full permitted capacity of each source.

As discussed in Section 2.1, the wells are not pumped to the permitted capacity due to drought, raw water quality, and special permit condition limitations. Figure 4-3 shows the capacity of each wellfield adjusted by what is practically achievable in each well, which is assumed to be equal to the maximum volume pumped in a day in 2024. In reality, these maximum day pumped volumes cannot be sustained for multiple days; most days the practical pumping volume is much lower. Even with the optimistic

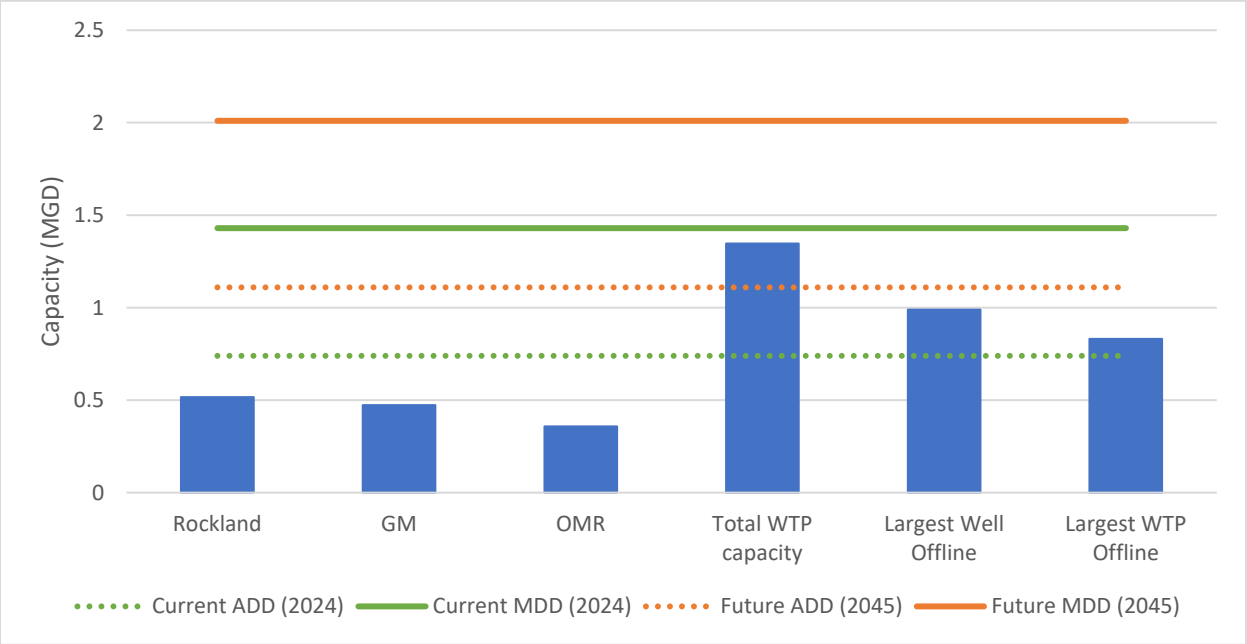
assumption that the wells can realistically pump this maximum observed rate, the current MDD cannot be met with all WTPs running.

Also discussed in Section 2.1, new well sources could add up to 1 MGD of new capacity at OMR and 0.5 MGD of new capacity at Rockland Avenue. The actual usable capacity of the new wells may be much lower due to water quality and drought limitations. Figure 4-4 shows the potential capacity of each wellfield assuming new wells are put into place but 50% of the maximum expected physical yield of each well will be usable after taking into consideration likely drought and water quality issues (i.e. 1 MGD * 50% = 0.5 MGD of new usable capacity can be added at OMR and 0.5 MGD * 50% = 0.25 MGD of new usable capacity can be added at Rockland Avenue). In this scenario, the current MDD can be met with the largest WTP offline, but current and future MDDs cannot be met with the largest WTP offline.



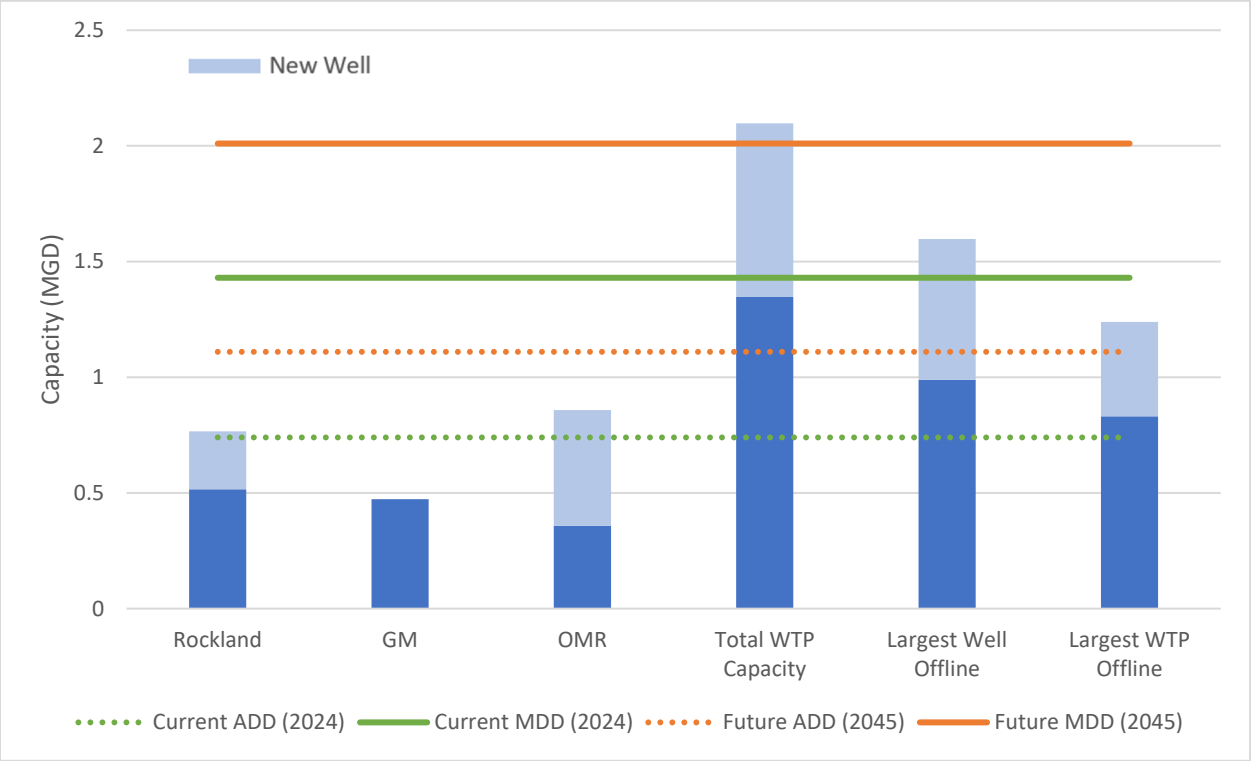
Demands Met (Y/N)	Total WTP Capacity	Largest Well Offline	Largest WTP Offline
Current ADD	Y	Y	Y
Future ADD	Y	Y	Y
Current MDD	Y	Y	Y
Future MDD	Y	Y	**N**

Figure 4-2. Permitted Capacity Compared to MDD and ADD.



Demands Met (Y/N)	Total WTP Capacity	Largest Well Offline	Largest WTP Offline
Current ADD	Y	Y	Y
Future ADD	Y	**N**	**N**
Current MDD	**N**	**N**	**N**
Future MDD	**N**	**N**	**N**

Figure 4-3. Practical Source Capacity Compared to MDD and ADD.



Demands Met (Y/N)	Total WTP Capacity	Largest Well Offline	Largest WTP Offline
Current ADD	Y	Y	Y
Future ADD	Y	Y	Y
Current MDD	Y	Y	**N**
Future MDD	Y	**N**	**N**

Figure 4-4. Practical Source Capacity with Future Wells Compared to MDD and ADD.

5.0 ALTERNATIVES ANALYSIS

The Town is facing increased demands on its water system, while supply is decreasing due to drought, raw water quality is decreasing, and regulatory compliance deadlines for new contaminants are on the horizon. The Town needs to make several short-term upgrades to address:

- aging infrastructure (as identified in the condition assessments),
- current water quality challenges, the high priority being manganese exceedance of OSRG and HA levels, and
- upcoming MCLs for newly regulated contaminants, the high priority being treatment of PFAS,

while putting into place a long-term solution to address inadequate water supply.

First, looking at the longer term supply requirements, the Town has two targets:

1) achieving a minimum water supply capacity of 1.11 MGD in ADD and 2.01 MGD in MDD by 2045, and
2) achieving a minimum water supply capacity of 1.28 MGD in ADD and 2.31 MGD in MDD by 2075.

There are three categories of alternatives that will be evaluated in this Master Plan to address the need for more capacity to meet estimated future demands:

- Full reliance on local (groundwater) sources,
- Partial reliance on groundwater sources and partial reliance on an MWRA interconnect, and
- Full reliance on an MWRA interconnect.

Under each category there is a wide range of WTP capacities (which are limited by source water capacity at that WTP) and corresponding interconnect capacities that will allow the Town to meet its 2075 projected MDD.

Re-establishing White Pond as a water source also broadens the range of interconnect sizes that can be considered. In 2021, the Town produced the "Water System Master Plan and White Pond Water Treatment & Transmission Feasibility Study" to evaluate the potential of re-establishing White Pond as a local surface water supply source. The cost of a transmission line and a 1 MGD WTP capable of addressing the water quality concerns (including PFAS treatment) was found to be $39.1 million in 2021 dollars, or $45.7 million in 2025 dollars.

White Pond may also be considered as an alternative interchangeable with an MWRA connection in the event an interconnect is deemed infeasible. The alternatives identified below in Section 5.3 are defined by establishing the practical range of WTP sizes; defining a reasonably achievable flow rate from each well based on water quality, permit, and availability conditions; and determining the corresponding interconnect size required.

5.1 RANGE OF WTP SIZES

The system-wide treatment plant capacity must aim to meet 2075 future MDD requirements while considering the desired redundancy and resiliency goals (to be able to meet the MDD with either the largest well or the largest treatment plant out of service). It is useful to define the largest advisable WTP capacity at each site based on aquifer and permit limitations to determine if the future MDD can be met using local sources of water.

As shown in Table 2-1, OMR is permitted to pump 0.870 MGD from the existing wells, while the physical well pumping capacity is a total of 1.368 MGD. If OMR test wells TW2-21 and TW3-21 are placed into service an additional 1.5 MGD of physical pumping capacity can be achieved, for a total of 2.868 MGD at this site. However, it is expected that the aquifer will only be able to pump a maximum of 1.870 MGD at any given time based on a cursory hydrogeological review (to be validated by further pump testing). Therefore, any wells providing additional pumping capacity above and beyond the aquifer capacity serve only to provide mechanical redundancy toward the goal of being able to supply the MDD with the largest well out of service. Utilizing 10% backwash recycling, the minimum advisable firm capacity (capacity with

redundant unit processes out of service for maintenance) of a new plant at OMR is 1.870 × 1.10 = 2.057 MGD. Note that the proposed firm capacity assumes all necessary treatment upgrades are put into place in the short-term to allow for full utilization of the permitted capacity of each well; in other words, throttling of wells will not be required to address raw water quality issues that overwhelm the WTP because it will be upgraded.

In the case of the Rockland Avenue WTP, the current design plant capacity is 1.440 MGD and the physical well pumping rate is 1.243 MGD. Based on a cursory hydrogeological review (to be validated by further pump testing), the aquifer will not likely be able to produce greater than the current permitted rate of 1.130 for all sources (existing and future). Thus, it is not advisable to upsize the Rockland Avenue WTP.

The Green Meadow WTP has a design capacity of 0.780 MGD including backwash recycle, and the physical well pumping capacity is 1.063 MGD. Though the permit generally allows for pumping of 0.726 MGD from the wells, special permit conditions are often triggered, requiring the Town to reduce pumping to half of the permitted capacity. For this reason, an expansion of the Green Meadow WTP would be a poor return on investment, and the plant capacity should stay the same.

When considering future treatment and WTP upgrades, combining the Green Meadow and OMR wells for treatment at a single site should be considered due to the proximity of the two sites and the opportunity to streamline future operations (discussed further in Section 5.4). To propose a flow rate for a future combined OMR/Green Meadow treatment facility, it is assumed that the full permitted well pumping capacity from both OMR and Green Meadow wells and an assumed additional 1.0 MGD of new well pumping from OMR can be combined for treatment at a single site. This leads to a recommended combined facility size of (0.780 + 1.870) × 1.1 = 2.935 MGD based on firm capacity and 10% backwash recycle.

The minimum recommended plant firm capacities are summarized in Table 5-1. Note that the final plant capacity will depend on the equipment provided by the manufacturer and provision of a redundant set of unit processes to allow one piece of equipment or a treatment train to be taken out of service for maintenance and still meet the required MDD.

Table 5-1. Recommended WTP Firm Capacity with 10% Backwash Recycle.

WTP	Current Design WTP Capacity (MGD)	Recommended Firm Capacity (MGD)
Old Marlboro Road	1.080	2.057
Rockland Avenue	1.440	1.440
Green Meadow	0.780	0.780
OMR + GM	1.860	2.935

5.2 REASONABLY ACHIEVABLE MAXIMUM PRODUCTION RATE

If the Town chooses to utilize a combination of local and non-local sources of water, the main driver of the sizing of the MWRA interconnect is the Town's redundancy goal of being able to meet the MDD with the largest WTP out of service. The MWRA interconnect should be able to convey enough water to supplement the Town's water production from local groundwater sources under conservative conditions (i.e. drought and poor raw water quality are limiting the ability to utilize the full production capacity of each well). The conservative circumstance is defined based on the "reasonably achievable maximum production rate" (RAMPR) for each well, which is determined based on the specific limitations for each well as summarized in Table 5-2. For most wells, the RAMPR is defined as the maximum day withdrawal in 2024 given that this is the most likely representation of the highest volume that can be pumped when considering the combination of water quality, drawdown, and drought factors. Given that the recommended WTP sizes give in Table 5-1 assume an optimistic view of well pumping constrained by aquifer capacity and permit limitations, future WTP capacities necessarily meet or exceed the RAMPRs for associated wells.

OMR is handled differently because the main cause of pumping limitations there is water quality. Appropriate treatment for iron and manganese must be implemented at this site, especially given that TW2-21 and TW3-21, which have iron and manganese concentrations 100 times and 10 times their respective SMCLs, will need to be placed into service to meet water quantity needs. Furthermore, organics and color must be adequately treated so that Well 3 can be placed back online. Once the water quality limitation is removed through construction of updated iron and manganese removal processes, the aquifer capacity becomes the limiting condition. It follows that the total RAMPR for all wells at this site must be set at the expected aquifer capacity of 1.870 MGD. The assumption of a total 1.870 MGD hinges on the ability to increase the water withdrawal permit for the site.

For the Rockland WTP, it is expected that one or more new wells producing a total of 0.5 MGD can be constructed. This assumption is included in determining the total RAMPR for the site. For Green Meadow, the RAMPR for Well 8 is based on the drawdown condition that triggers the requirement to operate at 50% of permitted flow, or 0.172 MGD. The RAMPR for a combined Green Meadow and OMR plant is simply the sum of the RAMPRs for each site.

Table 5-2. Reasonably Achievable Maximum Production Rate for Wells.

Site	Well ID	RAMPR (MGD)	Reasoning
OMR	Well 1 + 1A + 3	0.870	Appropriate treatment will be implemented, so wells can be utilized to 100% capacity.
	TW2-21	1	Appropriate treatment will be implemented, so wells can be utilized to 100% capacity. (Assumes permitted withdrawal can be increased.)
	TW3-21	0.5	Appropriate treatment will be implemented, so wells can be utilized to 100% capacity. (Assumes permitted withdrawal can be increased.)
	Site Maximum	*1.870*	*Maximum aquifer pumping capacity*
Rockland	Well 2	0.181	2024 Maximum Pumped
	Well 3	0.165	2024 Maximum Pumped
	Well 5	0.170	2024 Maximum Pumped
	Well TBD	0.5	Expected capacity of new well
	Site Maximum	*1.016*	*Sum of RAMPRs*
GM	Well 4	0.275	2024 Maximum Pumped
	Well 8	0.172	Based on permit special conditions that require 50% permitted flow rate when water level in wells drops.
	Site Maximum	*0.447*	*Sum of RAMPRs*
GM + OMR	OMR	1.870	Maximum aquifer capacity
	GM	0.447	Sum of RAMPRs for GM
	Site Maximum	*2.317*	*Sum of OMR aquifer capacity and RAMPRs for GM*

5.3 MWRA INTERCONNECT SIZING

The MWRA interconnect sizing that follows from WTP sizing and RAMPRs depends on the sub-alternatives considered. Ultimately, the MWRA interconnect must be sized for the difference between the 2075 MDD and the sum of RAMPRs with the largest WTP out of service. These sub-alternatives include:

- Whether or not OMR and Green Meadow WTPs have been combined in the short term to simplify operations (see Section 5.31),
- Whether the OMR WTP has been upsized to the maximum practical capacity as part of immediate-term upgrades, allowing full utilization of local sources of water, and
- Whether any plants are decommissioned plants in 2045 upon the establishment of the MWRA interconnect to further simplify local operational requirements.

Figure 5-1 graphically depicts each sub-alternative, including decommissioning WTPs in order of preference. Decommissioning WTPs if alternate water sources can be found is beneficial because it would reduce system-wide operation and maintenance requirements. Rockland Avenue would be decommissioned first because it is drought-impacted, aquifer-limited, and the property is space-limited. Green Meadow would be decommissioned second due to special permit condition limitations and limited space for expansion due to surrounding wetlands. OMR, which has the greatest potential for expansion hydraulically and spatially, would be decommissioned last. Note that under no circumstance was it found to be possible to meet the Town's redundancy and resiliency goal using just local groundwater sources.

The WTP size, RAMPR, and MWRA interconnect size for each alternative are tabulated in Table 5-3. The defining features of an alternative are the WTP size, decommissioning strategy, and resulting interconnect size. If the Town chooses to decommission WTPs to the point of having one or no WTPs operated locally, the interconnect must be sized to convey the full 2.31 MGD projected for 2075. If OMR is fully upsized and no plants are decommissioned (as in Alternatives 1 and 5), the MWRA interconnect can convey as little as 0.85 MGD.

It is worth noting that in the event that an MWRA connection is not possible, local interconnects will need to be explored; however, 2.31 MGD will be too large a quantity of water for a nearby PWS to supply. The White Pond source may be reestablished, along with a new WTP, to supplement any necessary capacity that cannot be covered by local interconnects.

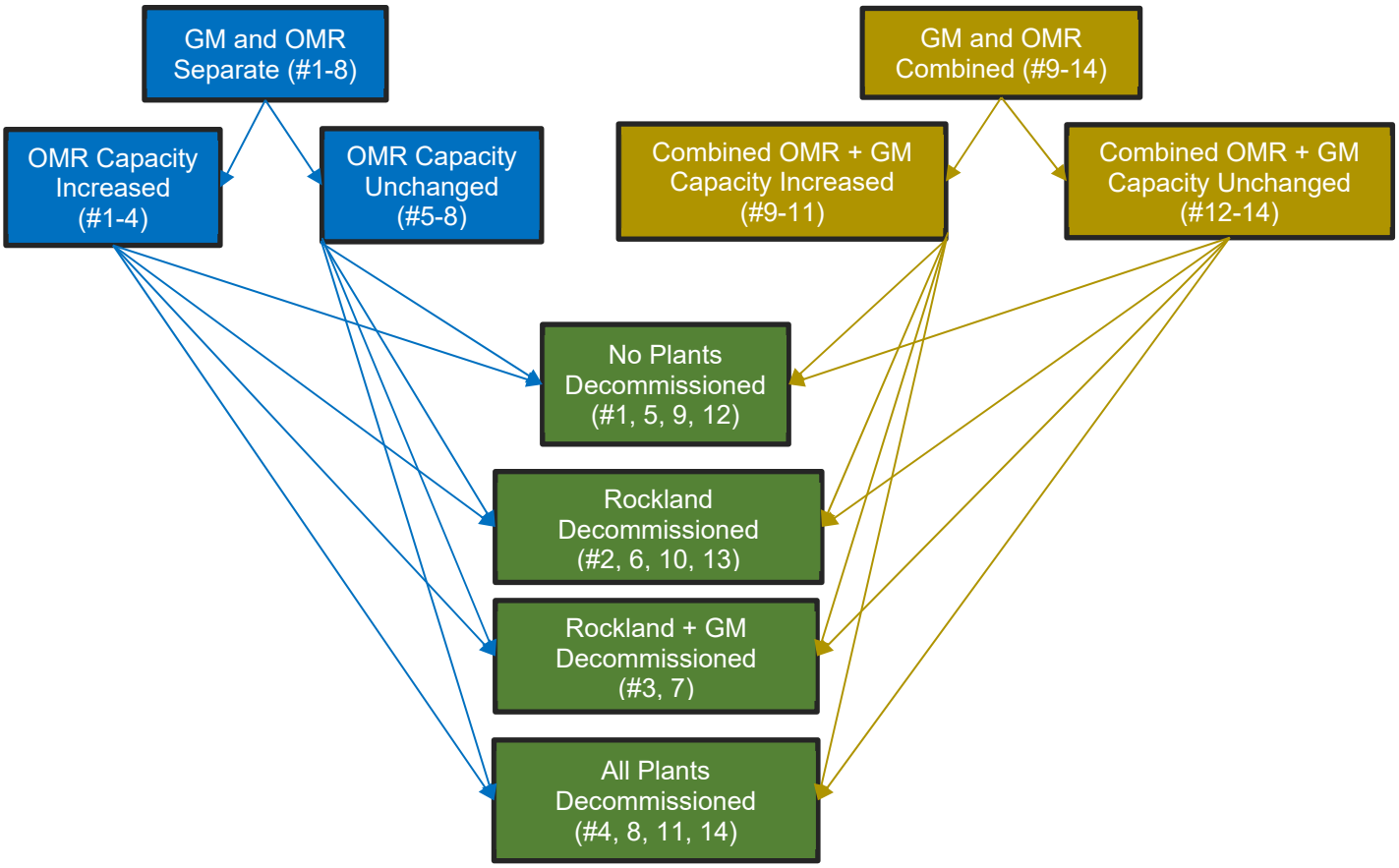


Figure 5-1. Summary of Alternative Categories.

Table 5-3. Alternatives Long List.

Alternative Number	OMR and GM Separate									
	Design WTP Flow Rate (MGD)			RAMPR (MGD)			Decommission in 2045			Required MWRA Interconnect Capacity (MGD)
	OMR	GM	Rockland	OMR	GM	Rockland	OMR	GM	Rockland	
1	**2.057**	0.78	1.44	*1.87*	0.447	1.016	No	No	No	0.85
2	**2.057**	0.78	1.44	*1.87*	0.447	1.016	No	No	Yes	1.86
3	**2.057**	0.78	1.44	*1.87*	0.447	1.016	No	Yes	Yes	2.31
4	**2.057**	0.78	1.44	*1.87*	0.447	1.016	Yes	Yes	Yes	2.31
5	1.08	0.78	1.44	1.08	0.447	1.016	No	No	No	0.85
6	1.08	0.78	1.44	1.08	0.447	1.016	No	No	Yes	1.86
7	1.08	0.78	1.44	1.08	0.447	1.016	No	Yes	Yes	2.31
8	1.08	0.78	1.44	1.08	0.447	1.016	Yes	Yes	Yes	2.31
Alternate Number	OMR and GM Combined									
	Design WTP Flow Rate (MGD)			RAMPR (MGD)			Decommission in 2045			Required MWRA Interconnect Capacity (MGD)
	GM + OMR		Rockland	GM + OMR		Rockland	GM + OMR		Rockland	
9	**2.935**		1.44	*2.317*		1.016	No		No	1.29
10	**2.935**		1.44	*2.317*		1.016	No		Yes	2.31
11	**2.935**		1.44	*2.317*		1.016	Yes		Yes	2.31
12	1.878		1.44	1.878		1.016	No		No	1.29
13	1.878		1.44	1.878		1.016	No		Yes	2.31
14	1.878		1.44	1.878		1.016	Yes		Yes	2.31

Bold indicates increased flow plant flow rate and production rate above existing permit limit**.**

5.4 ALTERNATIVES SHORT LIST

A high-level review of the 14 alternatives allows the development of a short list. The first category of alternatives worth considering for elimination is that which involves maintaining three separate treatment plants (i.e. Alternatives 1 through 8). Upgrades to Green Meadow will not have a high return on investment because any new processes (i.e. PFAS treatment) added will need to be sized for the current plant capacity of 0.780 MGD, while the plant will be run at the RAMPR of 0.447 MGD, or less than 60% of the maximum available capacity, whenever special permit conditions come into effect. The Green Meadow site also does not have sewer connectivity, which would cost approximately $500,000 to establish. Sewer connectivity is an important consideration for PFAS treatment due to the high volume of residuals that are generated. Increasing the WTP footprint to account for PFAS treatment needs may be challenging because the Green Meadow site has several space constraints due to surrounding natural resources, including forested areas, wetlands, and priority habits for rare species and wildlife. Should any future regulations necessitate an upgrade at this facility, there would be limited space to build on the existing plant.

It is also important to note that any addition of pressure vessels at Green Meadow is likely to require either intermediate process pumping or replacement of the existing 120 psi GreensandPlus™ filter vessels and well pumps to maintain the target pressure of 80 psi at the entry point to distribution. Figure 5-2A shows the existing hydraulic grade line of the WTP. Figure 5-2B shows an expected maximum 40 psi drop through a typical PFAS treatment vessel, leaving the distribution system pressure at the entry point below the target. Figure 5-2C shows the hydraulic grade line that must be achieved in an intermediate pumping scenario to maintain the desired distribution system entry point pressure. Figure 5-2D shows the hydraulic grade line that results when well pumps are upsized to add 40 psi upstream of any treatment. In this case, the four existing Greensand pressure vessels must be upgraded to 200 psi capacity to accommodate the increased upstream pressure. The vessel and pumping upgrades are expected to cost approximately $1.5 million. Both the intermediate pumping and through-pumping options require additional capital expenditures for a site that will already have a high capital cost per million gallons of water that will typically be produced given permit limitations.

Combining OMR with Green Meadow allows the water department to maintain only two plants instead of three, which would reduce both operational costs and the labor requirement for their limited staff. This is critical because there is high turnover with operational staff, and while this can be partially addressed by the development of operations and maintenance (O&M) manuals for each WTP and standard operating procedures (SOPs) for critical operational procedures, having fewer plants to operate is the most direct way to reduce training and staffing requirements.

Having a combined WTP would also centralize treatment at a location that has few spatial constraints if expansion is ever required in the future. For these reasons, and to avoid expensive upgrades at a recently upgraded plant, it is recommended to only consider options (Alternatives 9 through 14) that combine OMR and Green Meadow sources for treatment at the OMR WTP site.

Currently, raw water from Well 4 is conveyed north by a 12” ductile iron pipe to the Green Meadow WTP. Raw water from the Well 8 wellfield is conveyed west to the 12” DI line via 8” HDPE pipe, located alongside an 8” HDPE electrical conduit. To convey water from Green Meadow to OMR, flow from Well 4 can still be pumped north via the 12” DI line to the intersection with the 8” HDPE line, and flow can be reversed through the 8” line toward the OMR WTP, as shown in Figure 5-3. Well 8 pumps must be evaluated for replacement during design to meet the altered hydraulic requirements. This conveyance approach utilizes existing infrastructure and minimizes impacts to natural resources, specifically wetlands, priority habitats, and rare wildlife.

Another group of alternatives that can be eliminated includes options where OMR is not increased to the highest practical capacity (i.e. Alternatives 12 through 14) by developing new wells and bringing Well 3 back online. It is beneficial for the Town to maximize local sources of water to provide the necessary resiliency and redundancy.

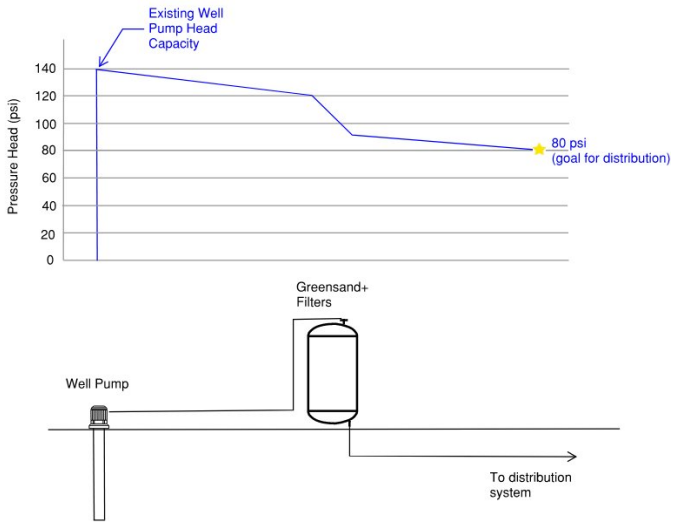
Similarly, Alternative 11 (100% reliance on outside sources of water) can be eliminated, because decommissioning all plants to rely solely on a connection with MWRA leaves the system vulnerable to failure since all backup supply options will have been decommissioned. To ensure redundancy, parallel water lines or other expensive investments may be required. As a result, only Alternates 9 and 10 are developed further. Alternative 9 involves:

- a firm capacity (capacity excluding redundant treatment processes that allow for equipment to be taken out of service for maintenance) of 2.935 MGD for the combined OMR/Green Meadow WTP at the OMR site,
- no plant decommissioning, and
- a 1.29 MGD MWRA interconnect capacity.

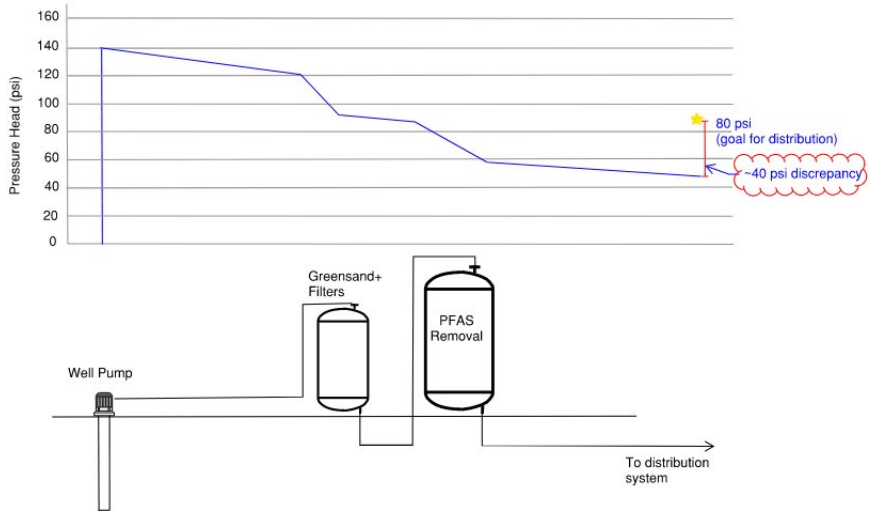
Alternative 10 involves:

- a firm capacity of 2.935 MGD for the combined OMR/Green Meadow WTP,
- Rockland WTP decommissioning in 2045, and
- a 2.31 MGD MWRA interconnect capacity.

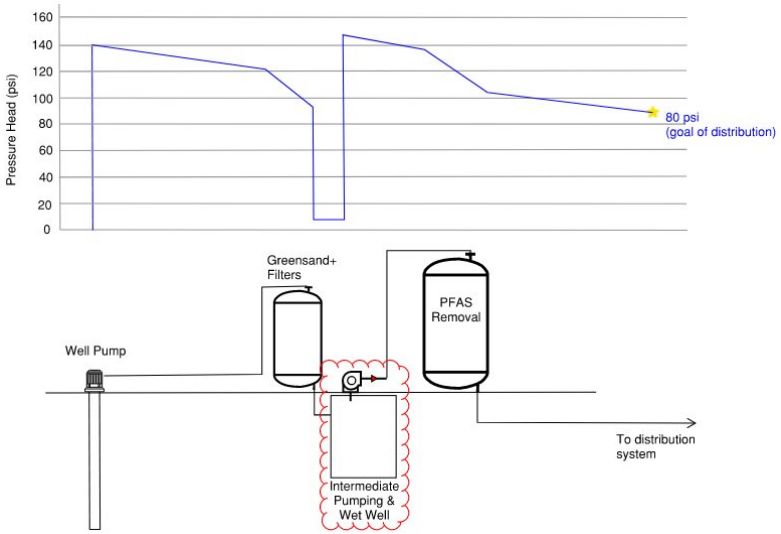
It is important to recall that until an MWRA interconnect is established, the Town cannot meet the current or future MDDs. Once new wells are brought online, the current MDD can be met with the largest well offline, though the future MDD cannot. Neither current nor future MDDs can be met with the largest WTP offline. To overcome this gap in redundancy, the water treatment plants must be build with several contingencies in place to minimize outages. Specifically, the generators must be sized to power 100% of all critical equipment. A redundant set of equipment must be in place for all major treatment processes to allow for routine and unexpected servicing without shutting the plant down entirely.



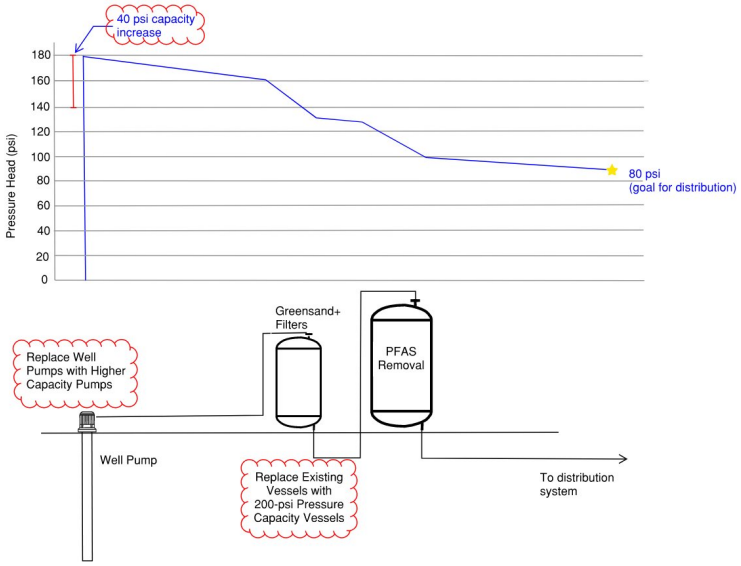
A. Existing conditions.



B. Through pumping with PFAS addition; no upsizing of pump.



C. Intermediate pumping and wet well for PFAS addition to meet distribution system entry point pressure goal.



D. Through-pumping with PFAS addition and upsizing of pump and vessel pressure rating to meet distribution system entry point pressure goal.

Figure 5-2. Green Meadow Pumping Scenarios.

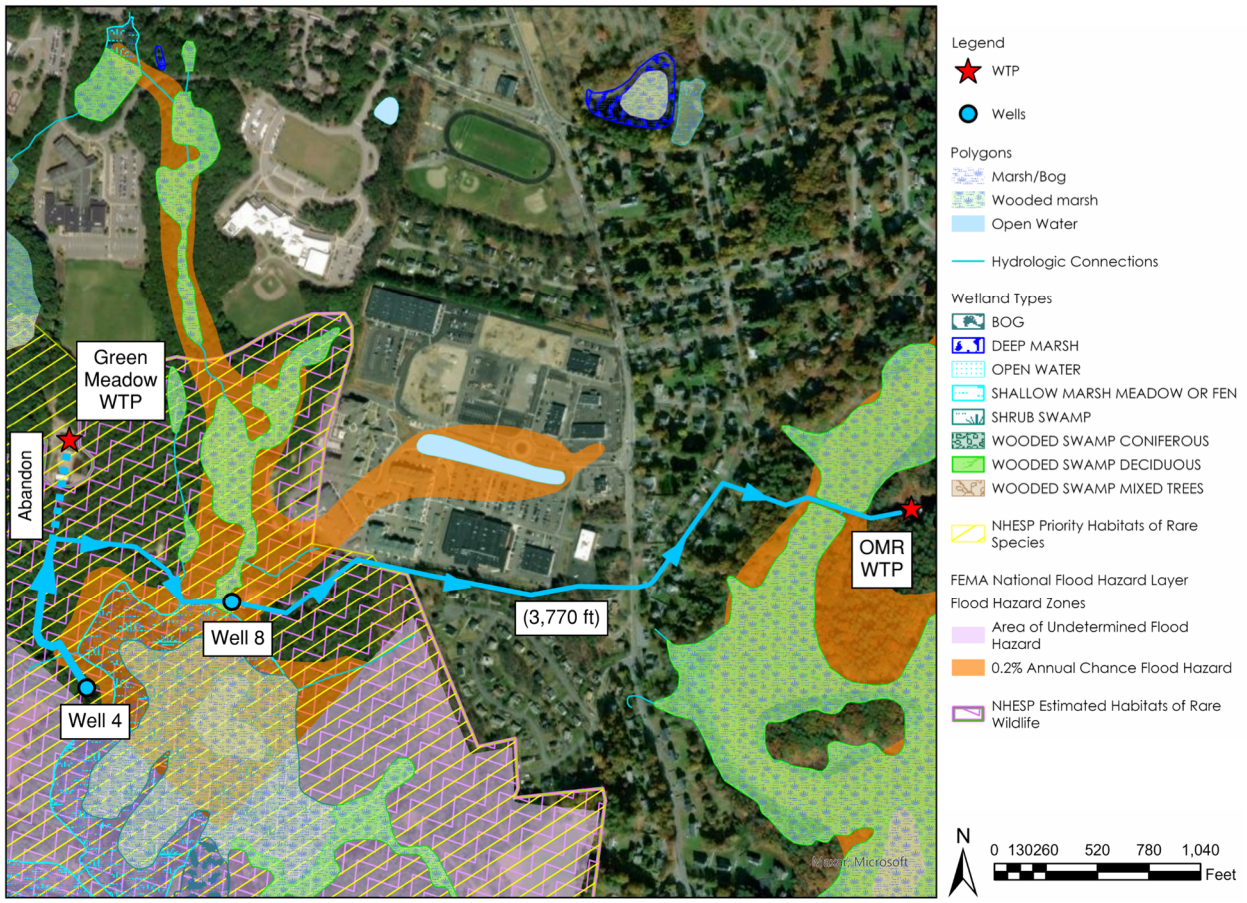


Figure 5-3. Proposed Conveyance of GM Well Water to the OMR WTP.

5.5 ANALYSIS OF SHORT-LISTED ALTERNATIVES

Alternate 9 involves combining treatment of the OMR wells with the Green Meadow wells at a new WTP, sizing the combined plant assuming a new permitted well production of 1.870 MGD at OMR, and maintaining the combined plant and Rockland Avenue WTP over the whole lifetime of the assets. This option requires an MWRA interconnect capable of delivering 1.29 MGD when considering the necessary supply to meet the future MDD given available RAMPR with the largest plant out of service. Based on target pipe velocities, an MWRA interconnect conveying this quantity of flow would likely be an 8" diameter pipe. Modeling is required to confirm pipe size in the design phase.

Alternate 10 involves also combining treatment of the OMR wells with the Green Meadow wells, sizing the combined plant assuming a new permitted well production of 1.870 MGD at OMR. The main difference from Alternative 9 is that in this alternative it is proposed to decommission the Rockland Avenue WTP when and if the MWRA interconnect can be placed into service (assumed to be 2045 for planning purposes). In this case, the interconnect must be sized to meet the future MDD of 2.31 MGD since the Town will only maintain one plant in the long-run. Based on target pipe velocities, an interconnect

conveying this flow would likely need to be a 12” diameter pipe. Modeling is required to confirm pipe size in the design phase.

The proposed MWRA interconnect to the Town of Maynard would occur via a northward extension of the service area from Framingham, a current MWRA member community, as shown in Figure 5-4. Maynard’s supply will come from the transmission line in the Town of Sudbury, and Maynard would have to purchase water from Sudbury. The hydraulic grade line for the Sudbury Water District is 385.0’ while that in Maynard is 384.86’. Therefore, a pump station is required to overcome head loss associated with conveying water through the system. The proposed pump station can be sited on a Town-owned parcel (**Figure 5-5**) at the border of Sudbury, 160 Waltham Street, and can connect into a watermain in that road. The existing watermain is 6” and can be replaced with an 8” or 12” main heading West up to Hayes Street depending on the total amount of water Maynard intends to purchase from Sudbury. A study of water age will need to be done before design to ensure that a 12” main will not lead to degraded water quality if less MWRA water ends up being purchased from Sudbury.

Blending treated surface water from the MWRA system with treated groundwater from the Maynard system can affect the resulting water chemistry within the distribution system. The main water chemistry concerns are:

- **pH stability**: USEPA guidelines suggest maintaining a pH range within one unit to ensure stability and prevent corrosion. Maynard finished water from all three WTPs has a target pH of 7.7, while MWRA supply water is around 9 - 9.5. pH. Stability is particularly important for maintaining the Town’s optimal corrosion control treatment strategy, which relies on the use of orthophosphate that requires a narrow range of pH to be effective, to reduce lead within the distribution system.

- **Orthophosphate addition**: It is assumed that water supplied by MWRA will not have added phosphates. Therefore, additional phosphate may need to be added at the pump station to ensure the phosphate concentration coming from Maynard WTPs is not diluted in the distribution system.

- **Disinfection**: MWRA currently uses chloramines to disinfect water, while Maynard uses sodium hypochlorite. If an MWRA interconnect is placed into service, it is recommended that the WTPs discontinue use of sodium hypochlorite and replace it with dosing of chloramines. Alternatively, the WTPs can target breakpoint chlorination and dose chloramines thereafter.

A detailed water blending study will need to be carried out ahead of design to address the aforementioned water quality concerns and ensure the chemistry of the blended water is stable, disinfection goals are upheld, and optimal corrosion control is maintained within the distribution system.

The viability of the interconnect will be explored in the MetroWest MWRA Feasibility Study. The cost of the system to each new member community will vary greatly depending on how many communities agree to participate. In the event that the MWRA connection is deemed infeasible, Maynard may seek to establish new, or improve upon existing, interconnects with neighboring Towns. Existing emergency interconnects can be upgraded to provide long-term service if the supplier is agreeable, though it is

unlikely that the neighboring Towns will collectively have enough excess supply to allow Maynard to meet its redundancy and resiliency goals. Alternately, the Town could consider placing the White Pond source back into service (requiring a new WTP and transmission main) in lieu of, or in conjunction with, an interconnect with neighboring towns.

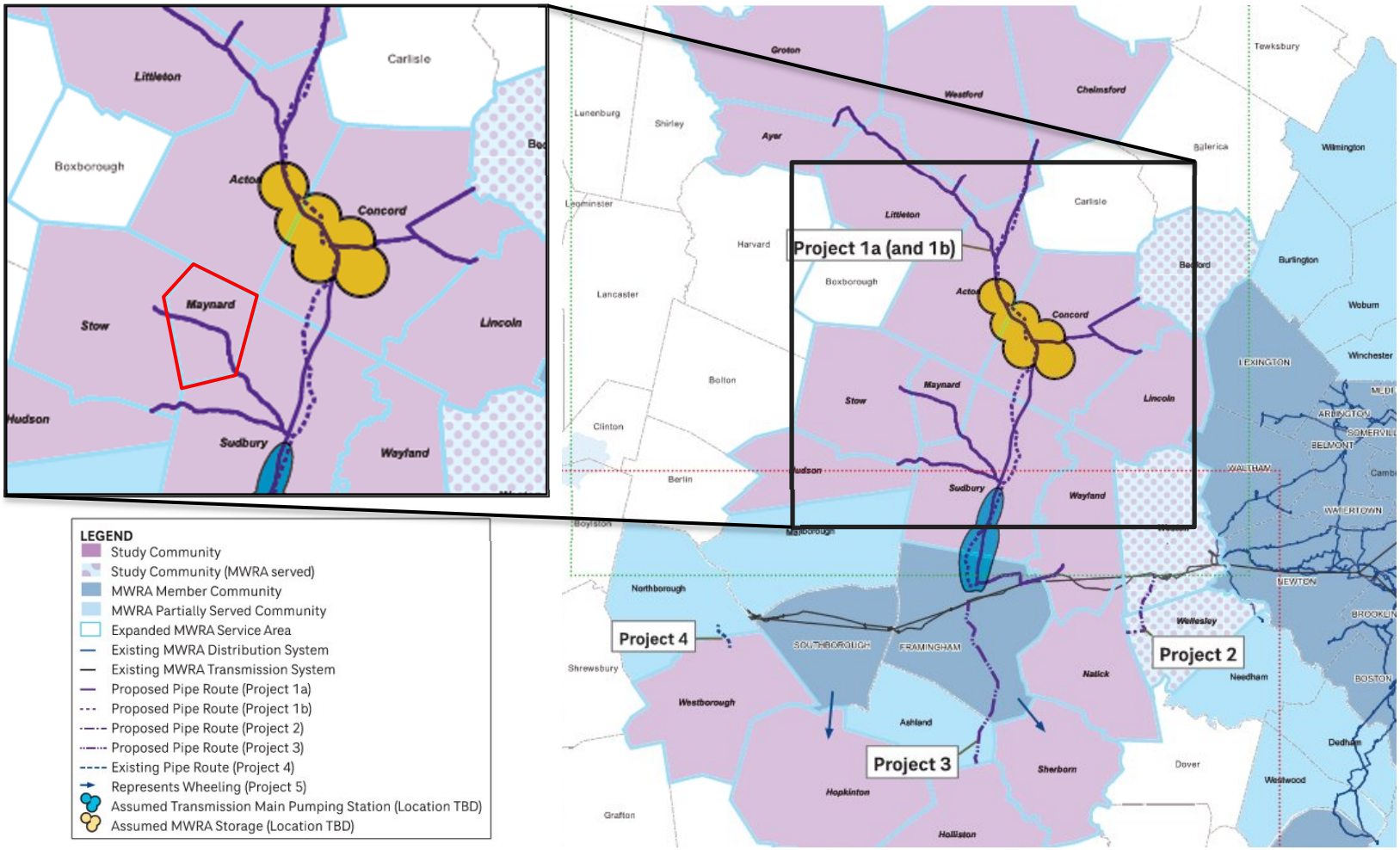


Figure 5-4. Proposed MWRA Service Area Extension.
Adapted from "MWRA Water System Expansion Evaluation to MetroWest Communities," CDM Smith. (July 2023)

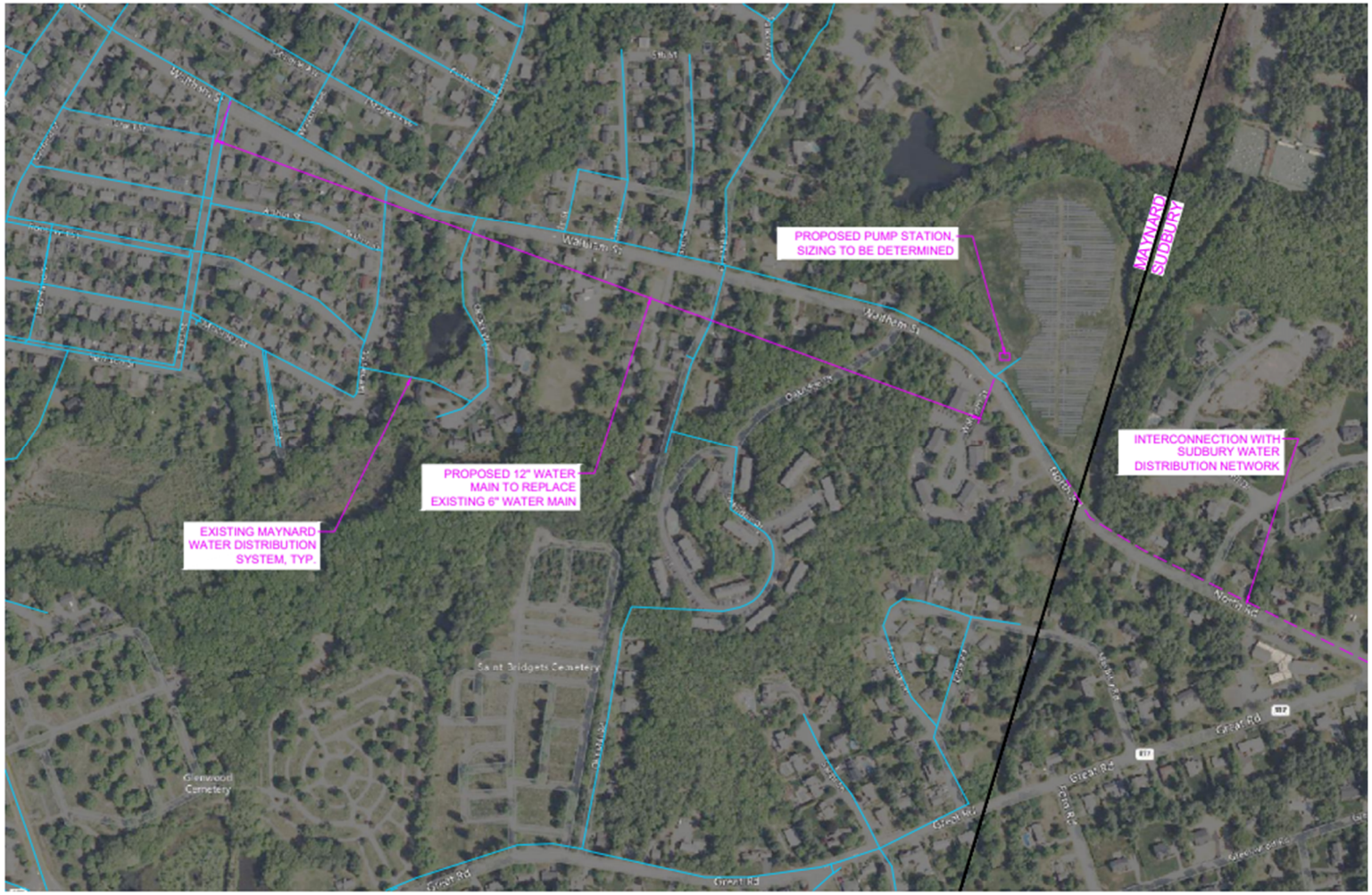


Figure 5-5. Proposed Pump Station Location and Watermain Upgrades.

6.0 DISTRIBUTION SYSTEM OPTIMIZATION

In addition to master planning for treatment system design, there are several upgrades to the distribution system that must be considered. Given increasing average and maximum day demands, the distribution system must be evaluated to verify adequate fire flow requirements for the growing population, identify areas where watermains must be replaced or upsized, and optimize water age to mitigate water quality issues. It is recommended that the Town develop a Distribution System Master Plan to pair with this Master Plan. It should include an evaluation of the adequacy of the existing water tanks to meet future storage needs. The Town would also like to explore replacing their partially buried storage tank with an at-grade storage tank. The feasibility of utilizing local interconnects must also be explored to understand the full breadth of alternatives to local water supply needs. Like the treatment system recommendations, distribution system improvements may be phased based on immediate needs, needs expected based on increased 2045 demands, and needs expected based on increased 2075 demands.

In addition to the hydraulic and water age evaluation, the future Distribution System Master Plan should include a water quality study to address the discoloration complaints that have increased in recent months. Specifically, a unidirectional flushing program may help to reduce discoloration in the system and should be developed as part of the Distribution System Master Plan.

7.0 PERMITTING AND CONSTRUCTION CONSIDERATIONS

7.1 WATER WITHDRAWAL PERMITTING

For both of the alternatives under consideration, the water withdrawal permit for the overall OMR site will need to increase. The Town must work to obtain maximum daily water withdrawal permits for TW2-21 and TW3-21 at 1 MGD and 0.5 MGD respectively, and the overall withdrawal limit for the OMR site alone must be increased from 0.870 MGD to at least 1.870 MGD. Currently, the average water withdrawal limit for all local water sources supplying Maynard, including White Pond, is 1.09 MGD. However, the ADD in 2045 is projected to be 1.11 and in 2075 is projected to be 1.28 MGD. Even if water supply via MWRA interconnect is established by 2045, it is still advisable to increase the systemwide annual average withdrawal limit for local water sources to a minimum of 1.28 MGD to ensure redundancy.

7.2 CONSTRUCTION CONSIDERATIONS

New conveyance pipe will need to be constructed in the Green Meadow area to convey Green Meadow source water to the OMR site for combined treatment. This water main construction will require permits due to crossing wetlands and habitats of rare species. A comprehensive list of permitting efforts will be evaluated in the preliminary engineering stage for this project.

If White Pond is to be reactivated, a new transmission main will be required to convey water to the Town. The existing 65-year-old 10” asbestos cement transmission line runs through the Assabet River National

Wildlife Refuge, a site which has a long history of military use and is the site of World War II ammunition bunkers. The site was categorized under the EPA's Superfund program in the 1980s and was cleaned up over many years and finally turned over to the United States Fish and Wildlife Services (USFWS) in 2000. Presumably, an easement exists for the existing transmission line, though documentation has not yet been located. Ideally, the new transmission main would be installed within the existing easement, requiring minimal modification to the easement boundaries.

Construction of a new transmission line carries with it the risk of encountering residual contamination remaining from the cleanup of the Superfund site. Additionally, the construction will be subject to permitting related to protecting the wetlands and other environmental resource areas that exist within the Refuge. Though alternate routing options that avoid the Refuge would significantly increase construction costs, the alternate routes may be required if existing easement documentation cannot be reconciled with the USFWS. A complete list of routing options and associated permits is provided in the White Pond Water Treatment & Transmission Feasibility Study Report (2021).

8.0 RECOMMENDED ALTERNATIVE

To meet the long-term (2075) water capacity needs of the Town, the two alternatives considered are:

> Alternative 9: Combining the Green Meadow and OMR well sources as an upsized WTP and maintaining the upgraded Rockland Avenue WTP through 2075 alongside an MWRA interconnect (whenever it can be established), and
>
> Alternative 10: Combining the Green Meadow and OMR wells for treatment at a single WTP at the OMR site and decommissioning the upgraded Rockland Avenue WTP once an MWRA interconnect is established.

In order to make a final recommendation, the following information is required from the MetroWest MWRA Feasibility Study:

- What will Maynard's initial capital investment be in the overall interconnect extension?
- What is the cost per gallon of MWRA water purchased from Sudbury?
- Will there be annual costs separate from the cost of purchased water to MWRA (or Sudbury) associated with maintenance and replacement of the MWRA-owned assets?
- Will MWRA require a minimum quantity of water to be purchased on an annual basis, either for economic viability or water age concerns?

Once these questions are answered, a cost comparison can be developed for the two alternatives. Regardless of the status of the forthcoming MWRA Feasibility Study, both alternatives assume the following major system improvements in the short-term:

- Implementation of potassium permanganate instead of chlorine as a pre-oxidant at Green Meadow to reduce DBP formation potential;
- Address inadequacies in the backwash recycling system at Green Meadow;
- Optimization of operations at OMR and Green Meadow to reduce risk of iron and manganese breakthrough;
- Distribution system master planning and water quality study, including the development of a unidirectional flushing program (UDF);
- Increase well capacity at both OMR and Rockland Avenue and complete the associated WMA permitting;
- Add PFAS treatment at Rockland Avenue and complete necessary upgrades identified in the condition assessment;
- Combine OMR and Green Meadow well sources for treatment at a new WTP at the OMR site to address organics, iron, manganese, and PFAS.

9.0 ROAD MAP

The upgrades proposed in this Master Plan must be phased and revisited based on several factors. Phasing of the work should mainly consider urgency of the upgrade (based on need, compliance deadlines, or other regulatory enforcement), and ease of implementation. Additionally, planning must be prioritized so that important needs can be addressed in a thoughtful way and do not become urgent. As such, the actions we recommend implementing immediately include:

- **Treatment upgrades:** Chemical dosing upgrades are not capital intensive and are simple to implement to reduce the risk water quality related violations while longer term solutions are being developed. It is recommended, based on jar testing, the Town switch the pre-oxidant at the Green Meadow WTP from chlorine to potassium permanganate to reduce formation of disinfection byproducts. The backwash recycling system at Green Meadows also needs to be evaluated for improvement. Additionally, the Town should implement a unidirectional flushing program to address buildup of contaminants in watermains. Detailed O&M manuals and SOPs are required to ensure that the upgraded infrastructure is operated optimally.

- **Water supply increases:** Increasing water supply for the Town is urgent. Finding and placing new wells into service in the vicinity of existing WTPs has comparatively lower cost and a quicker implementation timeline than the infrastructure upgrades needed to solve the Town's long-term water quantity and quality issues. The Town should proceed with pump testing at the test wells advanced at Rockland Avenue to determine how much additional water can be produced at the site. Additionally, the Town should commence the permitting process for TW2-21 and TW3-21 to place them into service ahead of OMR WTP upgrades that will enable the WTP to handle higher concentrations of iron and manganese.

- **Planning:** There are two feasibility studies being conducted concurrently with the evolution of this Master Plan that are critical to finalizing the alternative recommendation. The first is the OMR Treatment Feasibility Study, which seeks to address the best way to treat organics, iron, manganese, and PFAS in source water. Additionally, the MWRA MetroWest Feasibility Study will provide critical information for the capital and recurring cost of the MWRA interconnect extension through Sudbury to Maynard. Furthermore, water treatment pilot studies must be completed for both the combined Green Meadow and OMR facility (upon the completion of the Treatment Feasibility Study) and Rockland Avenue to inform treatment technology selection at each plant for PFAS treatment and associated pretreatment. The distribution system upgrades must also be identified as part of a future Distribution System Master Plan, which should include development of a UDF program and a water quality study to address distribution system aesthetic concerns. A Water Rate Study should be done to inform the strategy necessary to fund work that cannot be covered by water bill revenues.

Following the completion of the treatment pilot studies, the next milestone (PFAS compliance deadline of 2029) can be prioritized. Recall that PFAS MCL compliance is based on a running annual average for PFAS compounds, meaning PFAS treatment must be in place before the fourth quarter of 2028. Once

PFAS compliance is met, the next priority is to conduct an overall distribution water quality study and determine the implications of blending MWRA water with Maynard's local water sources through a desktop blending study and a pipe loop study. Concurrently, upgrades can be implemented to the distribution system in a phased manner based on the findings of the recommended distribution system master plan. Finally, an MWRA connection (including new pump station with associated chemical dosing and upsized distribution piping) can be designed as soon as it is necessary and possible, and the Rockland Avenue WTP can be decommissioned if desired. A visual representation of this phasing and prioritization is presented as a road map in Figure 9-1. The estimated total cost for each prioritized project is $67,175,000. A breakdown of costs is provided in Appendix F.

As the time approaches to place the MWRA interconnect (or alternative interconnect or White Pond) into service, this Master Plan should be revisited to assess whether critical assumptions have held true. Most importantly, it will be essential to evaluate how the actual ADD and MDD have increased, specifically whether it has been overestimated or underestimated. Similarly, it will be important to see if water availability has changed. There is a chance water availability will continue to decrease, but this will be balanced against having enhanced treatment at OMR which should allow for maximizing well water production. It is also essential to factor in whether water quality worsens over time, or if new regulations place further constraints on the use of existing water supplies.

It can be seen that there are several "yield points" at which the Master Plan should be revisited to check assumptions or updated based on new information. The Master Plan should be reviewed for updates at minimum every ten years. The Town may also consider the following yield points:

- A new regulation is put into place,
- A drastic change to water demand occurs,
- A drastic change to water availability occurs, or
- A drastic change to water quality occurs.

This Master Plan is meant to be adaptable and to serve as a guide to prioritize the implementation of feasibility studies, conceptual design, and detailed design, and construction.

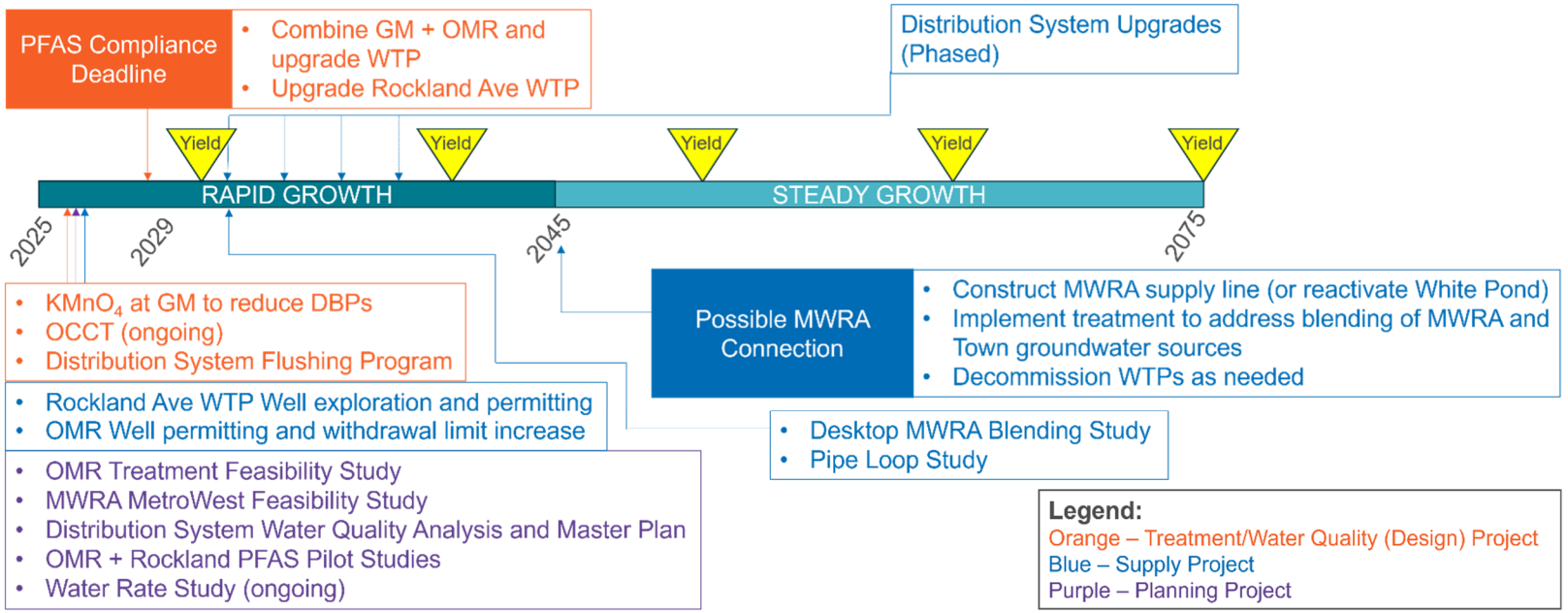


Figure 9-1. Master Plan Road Map.

10.0 CONCLUSION

The Town of Maynard is facing a condition of rapid population growth, decreasing water availability, and worsening water quality. This 2025 Water Supply and Treatment Master Plan outlines an adaptable 50-year strategy to address current and future water quality and quantity needs based on projected future ADD and MDD at two distinctive planning horizons. The first planning horizon (present day to 2045) considers a rapid population growth phase based on known commercial and residential development in the Town and sets the target for immediate upgrades to existing infrastructure to be implemented along with required PFAS upgrades by the US EPA April 2029 compliance deadline. The plan also outlines several possible future regulations to be considered in the conceptual design phase to future-proof the systems. The second planning horizon (2045-2075) considers a period of less rapid growth coinciding with the timing of when establishing alternate water sources, ideally a connection to MWRA supply, beyond the existing groundwater sources, becomes feasible.

Fourteen alternatives to meet Maynard's water supply and quality needs were explored. The alternatives look at a combination of well development, WTP sizing increases where possible, combining the OMR and Green Meadow plants, and decommissioning WTPs once alternate water supply is established. Among these alternatives, only two were considered capable of meeting the future goals while also reducing strain on limited staff, simplifying overall system operation, and reducing recurring costs. These alternatives involved three consistent features:

1. A short-term need for PFAS treatment at Rockland Avenue,
2. A short-term need for a combined OMR and Green Meadows WTP, and
3. A long-term need for partial reliance on MWRA (or an alternate) supply to meet redundancy goals.

Two critical studies are ongoing, the conclusions of which are required to develop costs and make a recommendation between the two alternatives. It is important to note that water withdrawal permit modifications are also required to meet future demands regardless of the alternative.

Necessary future studies are identified ahead of design to ensure a proactive approach rather than a reactive response to enforcement of current regulations, evolving regulations, and possible future violations based on worsening water quality. These studies are outlined and prioritized in a road map that the Town should revisit on a periodic basis to ensure the guidelines are still appropriate for the evolving reality. The proposed roadmap prioritizes immediate actions such as treatment upgrades and flushing programs to improve water quality, alongside long-term planning for treatment plant improvements and distribution system optimization. By revisiting the Master Plan periodically and adapting to new regulations, changes in water demand, and water quality challenges, the Town of Maynard can ensure a sustainable and reliable water supply for its residents through 2075 and beyond.

11.0 REFERENCES

1. Water System Master Plan and White Pond Treatment & Transmission Feasibility Study. December 2021. Stantec Consulting Services, Inc.
2. Old Marlboro Road Test Well Report. December 28, 2021. GeoInsight Environmental Strategy and Engineering.
3. MWRA Water System Expansion Evaluation to MetroWest Communities. July 2023. CDM Smith.
4. Immediate Response Action Status Report No. 2 August 28, 2020. GZA.
5. Groundwater Sample Results – Vicinity of White Pond. April 11, 2025. GZA.

Appendix A WMA PERMIT DOCUMENTS

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

February 8, 2024

Town of Maynard
Attn: Greg Johnson, Town Administrator
195 Main Street
Maynard, MA 01754

VIA ELECTRONIC MAIL
gjohnson@TownofMaynard.net

Re: PWS Town: Maynard
PWS Name: Maynard DPW, Water Division
PWS ID #: 2174000
Program: System Modification WS20 & WS25
Action: **Activation Approval**
MassDEP Transmittal #s: X288829, X288818

Dear Mr. Johnson,

On December 19, 2023, the Massachusetts Department of Environmental Protection (MassDEP) conducted a final inspection of Maynard DPW Water Division's (MWD) proposed new source (Wellfield 4A) and upgrades to the existing Well 4 Water Treatment Plant (WTP) which will treat Well 4 and Wellfield 4A for pH control, disinfection, and iron and manganese removal. MassDEP approved the WS25 and WS20 construction applications on April 5 and April 11, 2022, respectively. A letter was also issued by MassDEP on April 27, 2022, which modified a condition of each permit approval. A Water Management Act Permit Amendment was issued in August 2021 to include Wellfield 4A as an authorized withdrawal point.

Wellfield 4A is made up of four 8" x 12" gravel packed wells installed in 2023. The construction details of each well and permanent submersible pump in the wellfield are presented in the table below. Each well pump will be controlled by a variable frequency drive. Transducers are installed in each well and the pumps will be deactivated if the water level reaches two feet above the pump intake. The wells are programmed in SCADA to all pump simultaneously when called to run.

Well ID	**4A-1**	**4A-2**	**4A-3**	**4A-4**
Well Depth (ft)	39.1	50.1	37.5	29.8
Screen Length (ft)	5	10	5	5
Sanitary Seal Top (ft bgs)	6	6	6	6
Sanitary Seal Bottom (ft bgs)	26	26	26	20
Submersible Pump Design (gpm)	90	120	35	45
Submersible Pump Horsepower	25	15	5	5
Submersible Pump Inlet Setting (ft bgs)	28	28	28	24
Casing Height (ft ags)	3.6	3.6	3.9	4.3

Wells 4A-1 and 4A-2 are each pumped through a 6-inch line and manifolded together, pass by a flushing hydrant, and then manifold with the manifolded line from Wells 4A-3 and 4A-4, which are also joined with their own flushing hydrant. The manifolded line with the four wells transitions to an eight-inch line and is directed under wetlands and westward to the access road to Well 4. Individual raw water sample taps for each well are housed in a heated enclosure adjacent to the wells.

Eight-inch raw water lines for Well 4 and Wellfield 4A enter a newly constructed vault near the Well 4 WTP. The vault contains a sump pump with float switch to remove any accumulated water. Each raw water line passes by a sample tap, gate valve, and flow meter before they manifold to a 12-inch line. A 4-inch recycle line joins after the manifold in the vault. Water then passes through a raw water sample tap that flows to the WTP lab, then flows into the WTP, is injected with KOH and NaOCl, flows through a static mixer, a pH analyzer sample point, and through one of four 10-foot diameter Greensand Plus filter vessels in parallel (one newly installed, all vessels with new media, 24 inches Greensand Plus over 21 inches anthracite coal and a gravel support bed) with a total treatment rate of 700 GPM (1.008 MGD). Differential pressure sensors monitor headloss across each vessel to control when filters are backwashed, and sample taps are located on each filter effluent line. Filtered water flows through a flow meter, is injected with NaOCl and KOH, past pH and chlorine analyzers, and out to distribution. A continuous chlorine analyzer was installed in the janitor's closet at the Fowler School, approximately 2,000 feet downstream from the WTP. Equipment for potassium permanganate is onsite if needed in the future. A line for the backwash water clearwell splits off from the post-filter line before the chemical injection and flow meter. Clearwell fill is controlled by a valve through SCADA based on clearwell level. Spent backwash water flows to a 70,000-gallon holding tank, where the supernatant is either recycled to the raw water vault or pumped to the on-site lagoon via dewatering pumps. A valve is present to pump out lagoon sludge via tanker truck. The tank overflow is directed to the lagoon.

All chemical feed piping, storage, pumps, and appurtenances have been replaced and upgraded. Spare pumps are available for all chemicals. The WTP building was rehabilitated to include a new dehumidifier and heater, new flooring and ceiling, and repaired cracks in existing walls. The existing clearwell was cleaned, with a new vertical turbine pump installed for backwash. High-rate backwash runs at 800 gpm using water from the clearwell. The low-rate air/water backwash runs with water from the distribution system. A new 200 kw diesel generator was installed. The generator powers the WTP, Well 4, Wellfield 4A, the flow meter vault and the 4-log analyzer at the Fowler School. The failing leach field serving the WTP was replaced, and the existing septic tank remains. Analyzer waste with reagents is discharged to an onsite drywell. Reagentless analyzer waste is discharged to the backwash tank to be recycled to the raw water line.

MassDEP received the engineer's construction certification on December 20, 2023, completed by Katie Chamberlain, Commonwealth of Massachusetts Professional Engineer No. 54667. Water quality samples from Well 4, each well in Wellfield 4A, and the finished water leaving the plant were collected on December 15 and 19, 2023 and on January 2, 2024. The samples were analyzed for total coliform bacteria, iron, manganese, VOCs and PFAS6. Total coliform bacteria were absent. The raw water iron results for the wells in Wellfield 4A ranged from 4.5 mg/L to 7.64 mg/L, and manganese results ranged from 0.52 mg/L to 0.873 mg/L. The raw water iron result for Well 4 was 52.8 mg/L and the manganese result was 0.421 mg/L. The VOCs chloroform, toluene, and trichloroethylene were detected in the sources at levels far below the respective MCL. The iron result from the finished water

was 0.057 mg/L, below the SMCL of 0.3 mg/L, and manganese was not detected. A cross connection survey of the modified WTP was conducted on December 12, 2023, and found no violations or unprotected cross connections. Warning and shutdown alarms from before and after the filters were tested at the time of the inspection to confirm chemical feed and pump interlocks. Alarms triggered visual indicators in the WTP, called out to operators, and relayed each alarm to the Town's SCADA system.

Some items from the June 17, 2021, sanitary survey were addressed as part of this project. Flow meters were updated to mag meters to avoid clogging with iron. Backwash is now directed to a holding tank instead of unlined lagoons. The pH spikes after backwash cycles were addressed and SOPs were changed to mitigate the spikes. The travel time for water to the elementary school was found to be greater than the shutdown alarm delay of five minutes. As of the date of this letter, Maynard is in compliance with the above items as required in the 2021 sanitary survey. Maynard still has outstanding items from the 2021 sanitary survey that were not addressed as a part of this project.

This is an activation approval of Wellfield 4A and of modifications made to the existing Well 4 WTP. Approval for 4-log certification will be issued under separate cover. Based on the engineer's certification, and MassDEP's inspection, MassDEP approves the Supplier of Water's request to begin operating Wellfield 4A and the modified Well 4 WTP to include Wellfield 4A and Well 4. Pursuant to MassDEP's authority under 310 CMR 22.04(7) to require that each supplier of water operate and maintain its system in a manner that ensures the delivery of safe drinking water to consumers, this approval is made subject to the conditions set forth below.

1. Wellfield 4A Source Code and Approved Rate – Wellfield 4A shall be assigned a source code ID# of 2174000-08G. Wellfield 4A is approved to pump 0.3456 MGD (240 gpm). This rate shall not be exceeded in any 24-hour period.

2. Wellfield Definition – Wellfield 4A must meet the definition of a wellfield as defined in 310 CMR 22.02. A wellfield is defined as a series of three or more wells that are manifolded together provided that the wells:
   (a) shall be either suction lifted or individually pumped all at the same time;
   (b) shall have pump intake depths no greater than 28 feet below ground level; and
   (c) shall be a maximum distance of 50 feet apart.

3. Water Quality Sample Results – Within thirty (30) days of the date of this letter, submit to MassDEP the PFAS and VOC finished water sample results for the samples collected in December 2023 and January 2024.

4. UIC Drywell Permit – Within thirty (30) days of the date of this letter, a WS06 permit shall be filed with MassDEP for the onsite drywell at the WTP.

5. Well Completion Reports – Within sixty (60) days of the date of this letter, submit to MassDEP's Well Driller's Program well completion reports for Wells 4A-1, 4A-3 and 4A-4 in Wellfield 4A.

6. As-Built Plans – Within sixty (60) days of the date of this letter, submit to MassDEP as-built plans of the project incorporating all revisions to the project. Updated as-builts shall be added

to the O&M Manual and kept onsite.

7. Treatment System – Pursuant to 310 CMR 22.04(4), please be advised that after a treatment technique has been approved by MassDEP, the Supplier of Water shall install and maintain such treatment technique and implement any such approved procedures and practices in accordance with 310 CMR 22.00 and the terms and conditions of all applicable permits, approvals, and orders issued by MassDEP. This treatment system is designed to remove iron and manganese below the Secondary Maximum Contaminant Levels (SMCLs) of 0.3 mg/l for iron and 0.05 mg/l for manganese. The treatment facility shall be operated and maintained to ensure that the finished water does not exceed these limits at any time.

8. Sampling Plans – Monthly compliance sampling shall commence for total coliform bacteria from the combined Wellfield 4A sample tap and shall continue from Well 4 and the entry point in the WTP. MassDEP will send a revised water quality sampling schedule (WQSS) and TCR plan under separate cover reflecting operation of the new wellfield and WTP. All sampling shall be conducted in accordance with 310 CMR 22.00 requirements, including analysis by a MassDEP certified laboratory (as applicable) and results submitted to MassDEP in the required format. Any changes to the sampling/monitoring plan shall be reviewed and approved by MassDEP and incorporated into MWD's sampling plan. If you need more information or have further questions or concerns, please contact Paula Caron at 857-303-8004 or by email at Paula.Caron@mass.gov.

9. Lead and Copper Sampling – The activation of a new source (including replacement wells) or a long-term change in treatment have the potential to impact the water quality within the distribution system, which can affect lead and copper levels at consumer taps. Therefore, such changes warrant more frequent lead and copper monitoring in accordance with 310 CMR 22.06B(2)(b)3.c. In accordance with the approved lead and copper sampling plan, the Supplier of Water shall conduct lead and copper sampling for two consecutive six-month monitoring periods for a minimum of one year at sixty (60) approved sites (standard monitoring).

10. Wellfield 4A Microscopic Particulate Analysis – Due to the proximity of Wellfield 4A to surface water, microscopic particulate analysis (MPA) from the source will be required after it has been online for a minimum of six months. This testing will be included in the forthcoming sample schedule.

11. Water Treatment Plant Rating – In accordance with 310 CMR 22.11B, the upgraded Well 4 WTP (2174000-04T) is classified as a II-T treatment system. The Supplier of Water shall ensure that this Water Treatment Plant is operated by an operator with a grade II-T license or higher.

12. Chemical Addition Report – In accordance with 310 CMR 22.15(4), once the Chemical Feed System begins operation, every Supplier of Water shall report to MassDEP by the tenth day of the following month, the use of chemicals added to water supply. Such reports shall include, but not be limited to, the name of the chemical, the amount added, the resulting concentration of the chemical in the water, and the reason for adding the chemical to the water. Additional information on Chemical Addition Reports can be found on MassDEP website at https://www.mass.gov/how-to/chemical-addition-report. Separate forms shall be submitted for

each day tank.

13. Blanding's Turtle – Wellfield 4A is located within habitat for the Blanding's Turtle (Emydoidea blandingii, Threatened). Interim approval to allow water withdraws was provided by the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (MassWildlife). The Town of Maynard shall conduct interim operations in compliance with MassWildlife's monitoring and reporting requirements. Pumping at the approved rate of 0.3456 MGD is contingent on compliance with all MassWildlife's requirements.

If you have any questions regarding the source approval, please contact Tim O'Keefe of the Drinking Water Program at (781) 686-6867, or by email at Timothy.OKeefe@mass.gov. If you have any questions regarding the water treatment approval, please contact Stacy Johnson of the Drinking Water Program at (857) 268-3332 or by email at Stacy.Johnson@mass.gov.

Sincerely,

Robert A. Bostwick

Robert A. Bostwick
Section Chief
Drinking Water Program

Ecc: Drinking Water Program, BWR, MassDEP-Boston, MassDEP-CERO
Maynard DPW Water Superintendent – dpw@townofmaynard.net
Maynard Board of Health – kpawluczonek@townofmaynard.net
Katie Chamberlain, Stantec – Katie.Chamberlain@stantec.com

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

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Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

August 26, 2021

Gregory Johnson, Town Administrator
Town of Maynard
195 Main Street
Maynard, MA 01754

Re: PWS Town: Maynard
PWS Name: Maynard DPW - Water Division
PWS ID #: 2174000
WMA Permit #: 9P4-2-14-174.01
Applications: WM02 WMA Amendment and WMA 20 Year Permit Renewal
MassDEP WM02 Transmittal: X282469
Action: Final Permit

Dear Mr. Johnson:

Please find the attached documents:

- Findings of Fact in Support of the Amended and Renewed Permit #9P4-2-14-174.01; and
- Final Water Management Act Permit #9P4-2-14-174.01 (Concord Basin) for the Town of Maynard.

If you have any questions regarding this permit, please contact Susan Connors via e-mail at Susan.Connors@mass.gov or me at Marielle.Stone@mass.gov.

Sincerely,

Marielle Stone

Marielle Stone
Deputy Regional Director
Bureau of Water Resources

Ecc: Justin Demarco, Maynard DPW
Garry McCarthy, Stantec
Dave Harwood, GeoInsight
Jen Pederson, MWWA
Alison Field-Juma, OARS
Julia Blatt, Massachusetts Rivers Alliance
Sarah Bower, Massachusetts Rivers Alliance
David Paulson, Mass Division of Fisheries and Wildlife

Duane LeVangie,
MassDEP-WMA-Boston

Massachusetts Department of Environmental Protection
One Winter Street, Boston MA 02108 • Phone: 617-292-5751
Communication For Non-English Speaking Parties - 310 CMR 1.03(5)(a)

1 English:
This document is important and should be translated immediately. If you need this document translated, please contact MassDEP's Diversity Director at the telephone numbers listed below.

2 Español (Spanish):
Este documento es importante y debe ser traducido inmediatamente. Si necesita este documento traducido, por favor póngase en contacto con el Director de Diversidad MassDEP a los números de teléfono que aparecen más abajo.

3 Português (Portuguese):
Este documento é importante e deve ser traduzida imediatamente. Se você precisa deste documento traduzido, por favor, entre em contato com Diretor de Diversidade da MassDEP para os números de telefone listados abaixo.

4(a) 中國（傳統）(Chinese (Traditional):
本文件非常重要，應立即翻譯。如果您需要翻譯這份文件，請用下面列出的電話號碼與MassDEP的多樣性總監聯繫。

4(b) 中国（简体中文）(Chinese (Simplified):
本文件非常重要，应立即翻译。如果您需要翻译这份文件，请用下面列出的电话号码与MassDEP的多样性总监联系。

5 Ayisyen (franse kreyòl) (Haitian) (French Creole):
Dokiman sa-a se yon bagay enpòtan epi yo ta dwe tradui imedyatman. Si ou bezwen dokiman sa a tradui, tanpri kontakte Divèsite Direktè MassDEP a nan nimewo telefòn ki nan lis pi ba a.

6 Việt (Vietnamese):
Tài liệu này là rất quan trọng và cần được dịch ngay lập tức. Nếu bạn cần dịch tài liệu này, xin vui lòng liên hệ với Giám đốc MassDEP đa dạng tại các số điện thoại được liệt kê dưới đây.

7 ប្រទេសកម្ពុជា (Kmer (Cambodian):
ឯកសារនេះគឺមានសារៈសំខាន់និងគួរត្រូវបានបកប្រែភ្លាម។ ប្រសិនបើអ្នកត្រូវបានបកប្រែឯកសារនេះសូមទំនាក់ទំនងឆ្មោតជានាយក MassDEP នៅលេខទូរស័ព្ទដែលបានរាយខាងក្រោម។

8 Kriolu Kabuverdianu (Cape Verdean):
Es documento é importante e deve ser traduzido imidiatamente. Se bo precisa des documento traduzido, por favor contacta Director de Diversidade na MassDEP's pa es numero indicode li d'boche.

9 Русский язык (Russian):
Этот документ является важным и должно быть переведено сразу. Если вам нужен этот документ переведенный, пожалуйста, свяжитесь с директором разнообразия MassDEP по адресу телефонных номеров, указанных ниже.

10 العربية **(Arabic):**
هذه الوثيقة الهامة وينبغي أن تترجم على الفور. اذا كنت بحاجة الى هذه الوثيقة المترجمة، يرجى الاتصال مدير التنوع في PMassDE على أرقام الهواتف المدرجة أدناه.

11 한국어 **(Korean):**
이 문서는 중요하고 즉시 번역해야합니다. 당신이 번역이 문서가 필요하면 아래의 전화 번호로 MassDEP의 다양성 감독에 문의하시기 바랍니다.

12 հայերեն **(Armenian):**
Այս փաստաթուղթը շատ կարեւոր է եւ պետք է թարգմանել անմիջապես. Եթե Ձեզ անհրաժեշտ է այս փաստաթուղթը թարգմանվել դիմել MassDEP բազմազանությունը տնօրեն է հեռախոսահամարների թվարկված են ստորեւ.

13 فارسی **(Farsi (Persian):**
این سند مهم است و باید فورا ترجمه شده است.
اگر شما نیاز به این سند ترجمه شده، لطفا با ما تماس تنوع مدیر PMassDE در شماره تلفن های ذکر شده در زیر.

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Ce document est important et devrait être traduit immédiatement. Si vous avez besoin de ce document traduit, s'il vous plaît communiquer avec le directeur de la diversité MassDEP aux numéros de téléphone indiqués ci-dessous.

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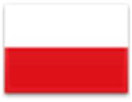
Dieses Dokument ist wichtig und sollte sofort übersetzt werden. Wenn Sie dieses Dokument übersetzt benötigen, wenden Sie sich bitte Diversity Director MassDEP die in den unten aufgeführten Telefonnummern.

16 Ελληνική (Greek):
Το έγγραφο αυτό είναι σημαντικό και θα πρέπει να μεταφραστούν αμέσως. Αν χρειάζεστε αυτό το έγγραφο μεταφράζεται, παρακαλούμε επικοινωνήστε Diversity Director MassDEP κατά τους αριθμούς τηλεφώνου που αναγράφεται πιο κάτω.

17 Italiano (Italian):
Questo documento è importante e dovrebbe essere tradotto immediatamente. Se avete bisogno di questo documento tradotto, si prega di contattare la diversità Direttore di MassDEP ai numeri di telefono elencati di seguito.



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Dokument ten jest ważny i powinien być natychmiast przetłumaczone. Jeśli potrzebujesz tego dokumentu tłumaczone, prosimy o kontakt z Dyrektorem MassDEP w różnorodności na numery telefonów wymienionych poniżej.

19 हिन्दी **(Hindi):**
यह दस्तावेज महत्वपूर्ण है और तुरंत अनुवाद किया जाना चाहिए. आप अनुवाद इस दस्तावेज़ की जरूरत है, नीचे सूचीबद्ध फोन नंबरों पर MassDEP की विविधता निदेशक से संपर्क करें.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

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Secretary

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Commissioner

Findings of Fact in Support of
Final Water Management Permit #9P4-2-14-174.01
Town of Maynard

The Massachusetts Department of Environmental Protection (MassDEP) makes the following Findings of Fact in support of the attached Final Water Management Permit #9P4-2-14-174.01 and includes herewith its reasons for issuing the final permit and for conditions of approval imposed, as required by M.G.L. c. 21G, § 11. The issuance of this permit is in response to the Water Management Act (WMA) permit renewal and amendment applications by the Town of Maynard. The amendment application is to add a new withdrawal point – Wellfield 4A.

MassDEP adopted revised Water Management Regulations at 310 CMR 36.00 on November 7, 2014, (described in greater detail below). Since that time, MassDEP has been working closely with each Water Management Act permittee to fully consider all aspects of their individual situations and ensure thoughtful and implementable permits.

Town of Maynard's Water Withdrawal History

The Town of Maynard (Maynard) holds a WMA registration statement (2-14-174.01) for an average annual daily withdrawal volume of 1.09 million gallons per day (MGD) which includes four wells (Maynard Wells 1, 1A, 3, and 4) and a reservoir (White Pond). The registered wells are further limited to approved maximum daily withdrawal rates assigned by MassDEP's Drinking Water Program. Wells 1, 1A and 3 (2174000-01G, -02G and -03G) have a combined maximum daily withdrawal rate of 0.87 MGD. Well 4 (-04G) has a maximum daily withdrawal rate of 0.38 MGD.

Maynard was issued a Water Management Act Permit in May 2000 to add Rock Wells 2, 3, and 5 (2174000-05G, -06G, and -07G) as bedrock sources with no additional system-wide authorized volume. In 2020 Maynard submitted a WMA Permit Amendment application to add a new Wellfield 4A as an authorized withdrawal point. Maynard has reported total annual withdrawals below their registered volume. In October 2020, Maynard's Water Supply Protection District Map was updated to include the Zone II for the new wellfield.

WMA Permit Extensions
Maynard's WMA Permit was initially set to expire on August 31, 2011. Prior to that date, the Permit Extension Act, Section 173 of Chapter 240 of the Acts of 2010, as amended by Sections 74 and 75 of Chapter 238 of the Acts of 2012, extended all existing permits by four years. Therefore, WMA permits for withdrawals in the Concord River basin were extended to August 31, 2015.

On April 8, 2015, MassDEP informed Maynard that MassDEP would need additional time before making a determination on the application in order to ensure that all permit renewal applicants in the Concord River Basin fully understood the new Water Management Regulations (discussed below), and to give proper consideration to all permit renewal applications within the basin. Pursuant to M.G.L. c. 30A, § 13, and 310 CMR 36.18(7), Maynard's permit continued in force and effect until MassDEP issues a final decision on the permit renewal application.

On August 28, 2015, Maynard submitted to MassDEP a WMA permit renewal application for their withdrawal in the Concord River Basin. MassDEP published notice of the permit renewal application in the Environmental Monitor on December 9, 2015. No comments were received regarding Maynard. On August 19, 2020, MassDEP issued Maynard an Order to Complete (OTC) and Notice of Noncompliance (NON) for both the renewal and amendment applications outlining specific information that was required to complete MassDEP's review of the applications. Responses were received from Maynard on October 14, 2020 and December 23, 2020.

The expiration date for all WMA permits going forward in the Concord River Basin will be August 31, 2031, in order to restore the staggered permitting schedule set forth in the regulations.

The Water Management Act (M.G.L. c. 21G)
The Water Management Act (Act) requires MassDEP to issue permits that balance a variety of factors including without limitation:

- Impact of the withdrawal on other water sources;
- Water available within the safe yield of the water source;
- Reasonable protection of existing water uses, land values, investments and enterprises;
- Proposed use of the water and other existing or projected uses of water from the water source;
- Municipal and Massachusetts Water Resources Commission (WRC) water resource management plans;
- Reasonable conservation consistent with efficient water use;
- Reasonable protection of public drinking water supplies, water quality, wastewater treatment capacity, waste assimilation capacity, groundwater recharge areas, navigation, hydropower resources, water-based recreation, wetland habitat, fish and wildlife, agriculture, flood plains; and
- Reasonable economic development and job creation.

Water Management Regulation Revisions
In 2010 the Executive Office of Energy and Environmental Affairs (EEA) convened the Sustainable Water Management Initiative (SWMI) for the purpose of incorporating the best available science into the management of the Commonwealth's water resources. SWMI was a

multi-year process that included a wide range of stakeholders and support from the Departments of Environmental Protection, Fish and Game, and Conservation and Recreation. In November 2012 the *Massachusetts Sustainable Water Management Initiative Framework Summary* (http://www.mass.gov/eea/docs/eea/water/swmi-framework-nov-2012.pdf) was released.

On November 7, 2014, MassDEP adopted revised Water Management Regulations at 310 CMR 36.00 that incorporate elements of the SWMI framework and the Water Conservation Standards adopted by the Massachusetts Water Resources Commission (WRC). The regulations reflect a carefully developed balance to protect the health of Massachusetts' water bodies while meeting the needs of businesses and communities for water.

Without limitation, MassDEP has incorporated the following into Water Management permitting:

- Safe yield determinations for the major river basins based on a new methodology developed through SWMI (see the Safe Yield in the Concord Basin section of this document or for more information on the Safe Yield methodology, go to the November 28, 2012 SWMI Framework Summary and Appendices);
- Water needs forecasts for public water suppliers developed by the Department of Conservation and Recreation, Office of Water Resources (DCR), using a methodology reviewed and approved by the Massachusetts WRC;
- Water supply protection measures for public water supplies including Zone II delineations for groundwater sources, and wellhead and surface water protection measures as required by Massachusetts Drinking Water Regulations (310 CMR 22.00);
- Water conservation standards reviewed and approved by the WRC in July 2006 and revised in July 2018 (https://www.mass.gov/doc/massachusetts-water-conservation-standards-2)/ including without limitation;
    - performance standard of 65 residential gallons per capita day or less;
    - performance standard of 10% or less unaccounted for water;
    - seasonal limits on nonessential outdoor water use;
    - a water conservation program that includes leak detection and repair, full metering of the system and proper maintenance of the meters, periodic review of pricing, and education and outreach to residents and industrial and commercial water users; and
- Environmental protections developed through SWMI, including without limitation;
    - protection for coldwater fish resources;
    - minimization of withdrawal impacts in areas stressed by groundwater use;
    - mitigation of the impacts of increasing withdrawals.

Safe Yield in the Concord River Basin

This permit is being issued under the safe yield methodology adopted by MassDEP on November 7, 2014, and described in the regulations at 310 CMR 36.13. As of the date of issuance of this permit, the Safe Yield calculation for the Concord River Basin is 87.50 million gallons per day (MGD), and total registered and permitted withdrawals are 36.79 MGD. This permit does not allocate any additional withdrawals and as such will not change the volumes authorized in the Concord River Basin. This renewed permit and all other permits currently being renewed in the Concord River Basin, will be within the safe yield of the Concord River Basin and may be further conditioned by the regulations.

Findings of Fact for Permit Conditions in Maynard's Water Management Act Permit
The Findings of Fact for the special conditions included in the permit generally describe the rationale and background for each special condition in the permit. This summary of permit special conditions is not intended to, and should not be construed as, modifying any of the permit special conditions. In the event of any ambiguity between this summary and the actual permit conditions, the permit language shall control.

Special Condition 1, Maximum Authorized Annual Average Withdrawal Volume, reflects the registered withdrawal volume of 1.09 MGD. No additional withdrawal volume is authorized by this permit.

Special Condition 2, Maximum Authorized Daily Withdrawals from each Withdrawal Points, specifies the maximum daily withdrawal rates by source, according to the approved rates established by MassDEP's Drinking Water Program. The Wellfield 4A project is subject to regulation by the Natural Heritage and Endangered Species Program (NHESP), File No 18-39732. On October 5, 2020 NHESP issued an Interim Approval for operation of a new public water supply well between 2021 and 2026 in order to collect additional information for Division review under 321 CMR 10.18.

Special Condition 3, Groundwater Supply Protection, includes the requirement for compliance with the Drinking Water Regulations at 310 CMR 22.21(2), Wellhead Protection Zoning and Nonzoning Controls. MassDEP issued a letter dated May 4, 2018 stating that Maynard has documented compliance with the required land use controls for the Zone II areas located within the Town of Maynard. Additionally, Maynard's Water Supply Protection District map was amended in 2021 to include the Zone II for Wellfield 4A. Maynard's Zone II areas extend into the towns of Acton, Stow and Sudbury. Until each community passes Ground Water Supply Protection requirements that satisfy the Regulations, MassDEP's Best Effort Requirement must be repeated for WMA water withdrawal permit reviews or amendments, new source approvals, monitoring waiver applications, Zone II re-delineations, and Sanitary Survey stipulations.

Special Condition 4, Performance Standards for Residential Gallons Per Capita Day Water Use and **Special Condition 5, Performance Standard for Unaccounted for Water** are part of the *Water Conservation Standards for the Commonwealth of Massachusetts* adopted by the MA Water Resources Commission in July 2018 and can be found at https://www.mass.gov/files/documents/2018/09/11/ma-water-conservation-standards-2018.pdf.

The RGPCD performance standard required of all Public Water System (PWS) permittees is 65 gallons per person per day. Permittees that cannot meet the performance standard within the timeframe in the permit must meet Functional Equivalence requirements outlined in Appendix A.

The UAW performance standard required for all PWS permittees is 10% for 2 out of every 3 years. Permittees that cannot comply within the timeframe in the permit must meet Functional Equivalence requirements based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36, as outlined in Appendix B.

Below is a table of Maynard's RGPCD and UAW values as approved by MassDEP from 2015 through 2020. Maynard has not met the UAW performance standard and the Permit requires that Maynard begin to implement the requirements in Appendix B of this Permit. MassDEP offers a grant program for WMA Registrants and Permittees to receive a free American Water Works Association (AWWA) M36 "Top-Down" Audit from a private consulting firm. Information on the grant is available at https://www.mass.gov/info-details/water-management-act-grant-programs-for-public-water-suppliers#m36-water-audit-opportunity-.

Maynard	2020	2019	2018	2017	2016	2015
RGPCD	54	49	50	53	51	56
UAW	17%	16%	14%	16%	17%	14%

Special Condition 6, Seasonal Limits on Nonessential Outdoor Water Use specifies the restrictions on nonessential outdoor water use from May through September and has changed since the existing permit issued in 2009. The options outlined in Special Condition 6 are based on whether the approved RGPCD for the previous year was in compliance with the RGPCD Performance Standard (see Special Condition 4, Performance Standard for RGPCD).

In addition, outdoor water use by suppliers, like Maynard, with wells in August net groundwater depleted subbasins[1] is limited to one or two days per week to minimize withdrawals from depleted subbasins.

Each year Maynard must choose one of two options for implementing nonessential outdoor watering restrictions:

- **Calendar triggered restrictions** are in place from May 1st through September 30th. Many public water suppliers find this option easier to implement and enforce than the streamflow triggered approach.
- **Streamflow triggered restrictions** are implemented at those times when streamflow falls below designated flow triggers measured at an assigned, web-based, real-time U.S. Geologic Survey (USGS) stream gage from May 1st through September 30th. At a minimum, restrictions commence when streamflow falls below the trigger for three consecutive days. Once implemented, the restrictions remain in place until streamflow at the assigned USGS local stream gage meets or exceeds the trigger streamflow for seven consecutive days.

If Maynard selects the streamflow trigger approach, it has been assigned USGS stream gage #01097000 Assabet River at Maynard, MA. The local gage streamflow triggers at this site are 119 cubic feet per second (cfs) for May and June, and 42 cfs for July, August and September. Should the reliability of flow measurement at this gage be so impaired as to question its accuracy, Maynard may request MassDEP's review and approval to transfer to another gage to trigger restrictions. MassDEP reserves the right to require use of a different gage.

[1] Subbasins used for WMA permitting are the 1,395 subbasins delineated by the U.S. Geological Survey in *Indicators of Streamflow Alteration, Habitat Fragmentation, Impervious Cover, and Water Quality for Massachusetts Stream Basins* (Weiskel *et al.*, 2010, USGS SIR 2009-5272).

- **The 7-Day Low Flow Trigger**, at which restrictions increase, is incorporated into both Calendar and Streamflow Triggered restrictions in order to provide additional protection to streamflows when flows are very low. The 7-day low flow trigger is based on the median value of the annual 7-day low flows for the period of record. The 7 day low-flow trigger for the Assabet River at Maynard Gage is 18 cfs.

Maynard may choose to implement limits on nonessential outdoor water use that are stricter than those required by the permit. This permit condition does not confer enforcement authority to the permittee. The Town of Maynard By-Laws effective October 3, 2020 provide enforcement authority and establishes penalties for violations of a Declaration of a State of Water Supply Conservation. However, the levels of restrictions in the By-Law do not reflect the amended permit requirements. Specifically, the levels include odd/even and a complete ban on outdoor water use and does not include one day or two days per week restrictions. A requirement to update Maynard's authority is included in Special Condition 6.

Special Condition 7, Requirement to Report Raw and Finished Water Volumes, ensures that the information necessary to evaluate compliance with the conditions included herein is accurately reported.

Special Condition 8, Water Conservation Requirements, incorporates the Water Conservation Standards for the Commonwealth of Massachusetts reviewed and approved by the Water Resources Commission in July 2018 (https://www.mass.gov/doc/massachusetts-water-conservation-standards-2).

Special Condition 9, Minimization of Groundwater Withdrawal impacts in Stressed Subbasins, requires permittees with permitted groundwater sources in subbasins with net groundwater depletion (August NGD) of 25% or more during August to minimize their withdrawal impacts on those subbasins to the greatest extent feasible, through optimization of source use, surface water releases to improve streamflows, outdoor water use restrictions and water conservation programs that go beyond standard Water Management permit requirements.

Maynard's new source (Wellfield 4A) is located in subbasin 12033 which has an August NGD of 77.4%. Maynard submitted a Minimization Plan as part of the applications which has been incorporated as a condition of this permit.

Maynard's surface water supply (White Pond) is located in the towns of Hudson and Stow. White Pond does not have a dam or spillway and therefore Maynard cannot make releases to improve streamflow. Maynard does not own any other surface water control structures in the Town of Maynard.

Maynard's new source (Wellfield 4A) along with four registered only sources are located in subbasin 12033 with an August NGD of 77.4%. Maynard's bedrock well sources are located in subbasin 12065 (August NGD 11.2%) and White Pond is in subbasin 12075 (August NGD of 28.0%.). This permit does not require that Maynard shift additional pumping away from subbasin 12033 because Maynard submitted information that their ability to shift demand is constrained by source capacity and water quality issues. The sources in subbasin 12065 are bedrock wells which have difficulty meeting their original design capacity and their surface

water source in subbasin 12075 is inactive. The limits on nonessential outdoor water use set forth in Special Condition 6 are restrictions developed to minimize withdrawals in August net groundwater depleted subbasins.

Based on MassDEP's records and information submitted by Maynard, MassDEP finds that minimization requirements will be met as follows:

- Maynard evaluates the rate structure every year.
- Maynard uses a 3-tier increasing block water rate as a tool to encourage water conservation.
- Maynard regulates the proper use of irrigation systems. Maynard's Water Rules and Regulations require that irrigation systems be equipped with a moisture sensor tied directly into a timing device so that irrigation is automatically prevented in response to rainfall and equipped with an automatic timing device so the system can be programmed to limit operation to prescribe restrictions on nonessential outdoor water use.
- Maynard has completed a water meter replacement upgrade with an automated, remote meter reading system.
- Maynard has regulations in place to protect the operation of fire hydrants and ensure their proper use.

Coldwater Fish Resource Protection was incorporated into the Water Management Regulation in November 2014. Coldwater Fish Resource protection is not a condition of this permit because Maynard's withdrawals do not impact any waters that the Massachusetts Division of Fisheries and Wildlife has identified as supporting coldwater fish at this time.

Mitigation of Impacts for Withdrawals that Exceed Baseline, was incorporated into the Water Management Regulations in November 2014, and requires mitigation, where feasible, for withdrawals over a baseline volume. Baseline withdrawal means the volume of water withdrawn during calendar year 2005 plus 5%, or the average annual volume withdrawn from 2003 through 2005 plus 5%, whichever is greater provided that:

(a) baseline cannot be less than a permittee's registered volume;
(b) baseline cannot be greater than the permittee's authorized volume for 2005; and
(c) if, during the period from 2003 to 2005, the permittee's withdrawals from the water source were interrupted due to contamination of the source or construction of a treatment plant, the Department will use best available data to establish a baseline volume from the water source.

The calculated baseline volume for Maynard is 397.85 million gallons per year (MGY) or 1.09 MGD which is the WMA registered volume. Mitigation is not a condition of the permit because the permit does not authorize any additional volume over the registered volume.

Response to Comments

Comments on the Draft permit were received from OARS, Inc. in a letter dated July 8, 2021 to MassDEP. Below is a summary of changes to the final permit and of MassDEP's and Maynard's response to comments.

- Maynard's UAW percentage for 2020 has been updated to 17% in the Findings of Fact to reflect MassDEP's review of the supporting documentation. One major main break was

not accepted as Confidently Estimated Municipal Use due to the fact that it was too long in duration and considered a leak.

- OARS Comment: *We recommend that MassDEP require Maynard to implement a water loss control plan within two years of the issuance of their permit renewal*.

  Response: Maynard is required to develop and implement a water loss control program following the *AWWA M36 Water Audits and Loss Control Programs* within 5 full calendar years of failing to meet the UAW standard. Special Condition 5 requires that Maynard complete a top-down water audit by June 30, 2022 which is the first step in a water loss control plan. If the data validity score is less than Level III (51-70), then steps must be taken to improve the reliability of data prior to developing a component analysis and long-term program to reduce real and apparent water losses. Developing data with an acceptable validity score can be a multi-year process, therefore a 5-year implementation schedule is the standard.

- OARS Comment: *Optimization opportunities need to be evaluated further and considered to adequately improve groundwater levels in subbasin 12033. We recommend that MassDEP requires Maynard to evaluate the option to pump the 4th bedrock well and shift pumping away from subbasin 12033, especially during summer when groundwater and streamflow are lowest.*

  Response: MassDEP reviewed Maynard's source optimization response (discussed previously) along with Maynard's conservation efforts and determined that the activities outlined in Special Condition 9 (which exceed conservation activities required in Special Condition 8) meet the minimization requirements for Maynard's applications.

  MassDEP's Guidelines and Policies for Public Water Systems state that "Due to the complex nature of bedrock fracture systems and the generally difficult task of determining the recharge area to a well constructed in bedrock, MassDEP requires that all viable unconsolidated aquifer deposits be considered prior to proposing development of a bedrock public supply well." Long term capacity in large bedrock wells is unstable as evidenced in 2018 in Maynard when its largest producing bedrock well experienced a partial collapse which almost resulted in a water emergency. Additionally, the location of Wellfield 4A was reviewed extensively by the Natural Heritage and Endangered Species Program and the wellfield operation will be monitored for five years by NHESP for habitat impact.

- OARS Comment: *If Maynard follows this recommended plan of reactivating the White Pond water supply, the ecological, flow and water quality impacts that could result need to be studied and evaluated in detail, particularly possible impacts on Lake Boon in Stow and Hudson.*

  Response: The comments are noted for future reference. These applications do not include a reactivation of White Pond.

- OARS Comment: *This plan should include stormwater recharge near the sources of water withdrawal impacts and mechanisms to ensure that all new development is water*

neutral by maximizing the efficiency of water use and paying into a mitigation fund or "water bank" if necessary, as recommended in the Report.

Response: MassDEP agrees that long term sustainability and climate resiliency are issues for all water suppliers. The comments are appropriate for projects subject for review through the Massachusetts Environmental Policy Act office and encourages Maynard to review local bylaws and regulations to promote aquifer recharge.

- OARS Comment: *MassDEP should require an Education and Outreach Plan be developed within one year of the issuance of the Final Permit to implement methods listed in the draft Permit for Public Education and Outreach. Please clarify that the permittee is required to implement the ten suggested actions shown in Table 5.*

  Response: MassDEP modified Special Condition 8 to specify that the water conservation and education plan be developed and implemented within one year of the date of the permit and to require a report on their efforts.

- OARS Comment: *A clear system of enforcement for irrigation systems should be utilized. If none exists, there needs to be a reporting or inspection system with enforcement follow-up. These irrigation systems must also comply with the restricted nonessential outdoor water uses listed in the draft Permit (p. 5).*

  Response: Maynard is required to update their By-Laws and/or Water Rules and Regulations to provide authority to implement and enforce water use restrictions. All customers of Maynard are required to comply with restrictions on nonessential outdoor water use.

Maynard provided the following response to recommendations from the 2014 Weston and Sampson report listed in the comment letter.

- The town should conduct leak detection annually until UAW declines significantly, begin to monitor billing discrepancies to identify leaks, and create a two-year schedule for retrofitting remaining municipal buildings.
  We conduct yearly town wide leak detection in the spring/summer, and have for the past 8 years. Our UAW from 2019 to 2020 was reduced by 3.5% to 12.5%, and we continue to evaluate our system, and conduct improvements to reach the UAW performance standard of 10%. Our quarterly usage / billing reads are monitored for discrepancies verse average usage spikes.

- Institute a more robust outreach and education program.
  Our current residential performance standard is 54 gallons per capita per day. Maynard's use is well below conservation performance standard recommendation of 65 gallons per capita per day. Maynard DPW continues to review outreach / education processes utilized throughout the industry by other public drinking water suppliers to continue to enhance effective means of conservation education for our utility.

- Adjust block rate volumes and pricing annually as needed; conduct system audits every five years.
  Over the past three years the DPW has conducted a thorough yearly financial evaluation and yearly incremental recommendation of our user fees in conjunction with our capital improvement plans. Our fees are based on a 4 block tiered use system format that enhances and rewards water conservation. Our fee structure has been a proven industry standard to promote water conservation through reduced fees for less use. Our 54 gallons per capita per day use statistics are the result of this financial model.

  Maynard DPW in conjunction with our consultant firm Stantec are preparing to apply for DEP water system audit grant in September.

  MassDEP notes that annual water rate review is required as a minimization measure.

- For development and redevelopment, require WaterSense (or better) fixtures and washing machines
  Through by-Law and building code. The town of Maynard is a proactive sustainable community. The town has adopted stretch energy code, and continues to explore sustainable conservation initiatives in all manner and form.

- Prohibit connection of any new irrigation systems to the public water supply, consider extending seasonal water limits to private well users and adopt a system to register and regulate existing or new irrigation systems.
  The town of Maynard is a very low irrigation use community, this is based on the design and build of the historic mill town with 80% of the residential dwellings built on parcels less than a ¼ acre in an urban element. Our current practice which has been in effect for over ten years, is to implement mandatory non-essential outdoor water use between May-November between 9am – 5pm, seven days a week.

  The Town of Maynard supplies public water supply to 98% of all dwellings, there are very few private wells registered with the local board of health.

  Maynard's adopted water rules and regulations require water sensors on all irrigations systems, and our operational protocols for service staff is to document many aspects of our residential connections, from service pipe material (Lead), backflow devices, meter and radio type/age, irrigation system including rain sensor, leaks etc. This is implemented whenever there is a service request.

- Create a town water guidance document or master plan, including sections on drought management and water demand.
  Maynard DPW currently has an extensive information packet related to this request at the following https://www.townofmaynard-ma.gov/dpw/water-restriction/ with several resources, and redirect links to drought management conditions.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

WATER WITHDRAWAL PERMIT
MGL C 21G

This permit is issued pursuant to the Massachusetts Water Management Act (the Act) for the sole purpose of authorizing the withdrawal of a volume of water as stated herein and subject to the following special and general conditions. This permit conveys no right in or to any property beyond the right to withdraw the volume of water for which it is issued.

PERMIT NUMBER: 9P4-2-14-174.01 **RIVER BASIN:** Concord

PERMITTEE: Town of Maynard

EFFECTIVE DATE: August 26, 2021

EXPIRATION DATE: August 31, 2031

NUMBER OF WITHDRAWAL POINTS: 4
Groundwater: 4 Surface Water: 0

USE: Public Water Supply

DAYS OF OPERATION: 365

LOCATION(S):

Table 1: Withdrawal Point Identification

Source Name	PWS Source ID Code
Rock Well #2	2174000-05G
Rock Well #3	2174000-06G
Rock Well #5	2174000-07G
Wellfield #4A	To Be Assigned

SPECIAL PERMIT CONDITIONS

1. Maximum Authorized Annual Average Withdrawal Volume

This permit does not authorize any additional withdrawal volume over the Town of Maynard's registration statement (#2-14-174.01) of 1.09 million gallons per day (MGD) or 397.85 Million Gallons per year (MGY). The Department of Environmental Protection (MassDEP) bases the authorized withdrawal volume on the raw water withdrawn from the authorized withdrawal points and will use the raw water amount to assess compliance with the registered withdrawal volumes.

2. Maximum Authorized Daily Withdrawals from each Withdrawal Point

Withdrawals from individual withdrawal points are not to exceed the approved maximum daily volumes listed below in Table 2 without specific advance written approval from MassDEP. The authorized maximum daily volume is the approved rate of each source. In no event shall the combined withdrawals from the individual withdrawal points exceed the withdrawal volumes authorized above in Special Condition 1.

Table 2: Maximum Authorized Daily Withdrawal Volumes

Source Name	PWS Source ID Code	Approved Rate
Rock Well #2	2174000-05G	322 gpm (0.465 MGD)
Rock Well #3	2174000-06G	199 gpm (0.287 MGD)
Rock Well #5	2174000-07G	263 gpm (0.379 MGD)
Wellfield #4A*	To Be Assigned	240 gpm (0.346 MGD)

*Maynard shall operate Wellfield #4A in accordance with the Interim Approval issued October 5, 2020 by the Natural Heritage and Endangered Species Program (NHESP), File Number 18-39732 and any NHESP subsequent decisions.

3. Ground Water Supply Protection

MassDEP records indicate that Maynard's permitted ground water sources meet MassDEP's ground water supply protection requirements of the Drinking Water Regulations at 310 CMR 22.21(2), including a floor drain regulation, for the Zone II areas within Maynard's municipal boundary. Maynard's Zone II areas extend into the towns of Acton, Stow, and Sudbury.

The Best Effort Requirement will need to be repeated, at MassDEP's direction, for WMA water withdrawal permit reviews or amendments, new source approvals, monitoring waiver applications, Zone II re-delineations, and Sanitary Survey stipulations; until those communities adopt the appropriate controls and include Maynard's Zone II areas in their protection districts.

4. Performance Standard for Residential Gallons Per Capita Day Water Use

Maynard's performance standard for residential gallons per capita day (RGPCD) is 65 gallons or less. Maynard shall be in compliance with this performance standard. If Maynard does not meet the standard, Maynard shall be in compliance with the functional equivalence requirements (Appendix A). Maynard shall report its RGPCD water use annually in its Annual Statistical Report (ASR).

5. Performance Standard for Unaccounted for Water

Maynard's Performance Standard for Unaccounted for Water (UAW) is 10% or less of overall water withdrawal for 2 of the most recent 3 years throughout the permit period. Maynard does not meet the standard based on data through 2020. Maynard shall implement the Functional Equivalence Requirements based on the AWWA/IWA Water Audits and Loss Control Programs, Manual of Water Supply Practices M36, as outlined in Appendix B. **By June 30, 2022 submit to MassDEP the results of an annual "top down" water audit.**

Maynard is required to report its UAW annually in its Annual Statistical Report (ASR) so as to document compliance with this performance standard. Maynard's ASR shall include the calculation used to derive that figure including, without limitation, the source of data used, the methodology for calculating UAW and any assumptions used in making the calculation. Nothing in the Permit shall prevent a permittee who meets the 10% performance standard from developing and implementing a water loss control program following the AWWA M36 Water Audits and Loss Control Programs. Permittees implementing a water loss control program based on AWWA M36 annual water audits and guidance shall continue to report UAW annually as required in the Annual Statistical Report for public water suppliers.

6. Seasonal Limits on Nonessential Outdoor Water Use

Maynard shall limit nonessential outdoor water use through mandatory restrictions from May 1st through September 30th annually as outlined below beginning calendar year 2022. To the extent feasible, all summer outdoor water use should take place before 9 a.m. and after 5 p.m. when evaporation and evapotranspiration rates are lower.

For calendar year 2021, Maynard shall continue to implement restrictions as has been done in the past. By June 1, 2022 Maynard shall review and update the By-Laws and/or Maynard's Water Rules and Regulations to provide authority to implement water use restrictions as described in this permit. MassDEP has developed the "DEP Model Outdoor Water Use Bylaw/Ordinance" to help municipalities and water districts implement seasonal water conservation requirements. The Model Bylaw also includes options for regulating private wells and in-ground irrigation systems. See https://www.mass.gov/service-details/model-water-use-restriction-bylawordinance-update.

Continued on next page.

Table 3: Seasonal Limits on Nonessential Outdoor Water Use

For Permittees meeting the 65 RGPCD Standard for the preceding year RGPCD ≤ 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is allowed: a) **Two (2) days per week** before 9 am and after 5 pm; **and** b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01097000 Assabet River at Maynard, MA falls below **18 cfs** for three (3) consecutive days. Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.
Streamflow Triggered Restrictions	Nonessential outdoor water use is allowed: a) **Two (2) days per week** before 9 am and after 5 pm when USGS stream gage 01097000 Assabet River at Maynard, MA falls below: • May 1 – June 30: **119 cfs** for three (3) consecutive days • July 1 – September 30: **42 cfs** for three (3) consecutive day**s** b) **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01097000 Assabet River at Maynard, MA falls below **18 cfs** for three (3) consecutive days. Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.
For Permittees NOT meeting the 65 RGPCD standard for the preceding year RGPCD > 65 as reported in the ASR and accepted by MassDEP	
Calendar Triggered Restrictions	Nonessential outdoor water use is allowed **one (1) day per week** before 9 am and after 5pm;
Streamflow Triggered Restrictions	Nonessential outdoor water use is allowed **one (1) day per week** before 9 am and after 5 pm when USGS stream gage 01097000 Assabet River at Maynard, MA falls below: • May 1 – June 30: **119 cfs** for three (3) consecutive days • July 1 – September 30: **42 cfs** for three (3) consecutive days Once implemented, the restrictions shall remain in place until streamflow at the gage meets or exceeds the trigger streamflow for seven (7) consecutive days.

Table 4: Instructions for Accessing Streamflow Website Information
If Maynard chooses Streamflow Triggered Restrictions, Maynard shall be responsible for tracking streamflows and drought advisories and recording and reporting to MassDEP when restrictions are implemented.
Streamflow information is available at the USGS National Water Information System (NWIS): Web Interface. The USGS NWIS default shows Massachusetts streamflows in real time, i.e., the most recent, usually quarterly hourly, reading made at each USGS stream gage. Seasonal Limits on Nonessential Outdoor Water Use are implemented when the mean daily streamflow falls below the designated trigger for 3 consecutive days. The mean daily flow is not calculated until after midnight each day when the USGS computes the hourly data into a mean daily streamflow. As a result, permittees must use the mean daily streamflow from the preceding day when tracking streamflows. **Mean daily streamflow gage** readings are available at the USGS NWIS Web Interface at http://waterdata.usgs.gov/ma/nwis/current/?type=flow. • Scroll down to 01097000 Assabet River at Maynard, MA. • Click on the gage number. • Scroll down to "Provisional Date Subject to Revision – Available data for this site" and click on the drop-down menu. • Click on "Time-series: Daily data" and hit GO. • Scroll down to the "Available Parameters" box. Within the box, be sure "00060 Discharge (Mean)" is checked, then, under "Output Format" click "Table" and hit GO. • Scroll down to "Daily Mean Discharge, cubic feet per second" table and find the current date on the table. • Compare the cubic feet per second (cfs) measurement shown on the table to the cfs shown under Streamflow Triggered Restrictions above.

Restricted Nonessential Outdoor Water Uses

Nonessential outdoor water uses that are subject to mandatory restrictions include:

- irrigation of lawns via automatic irrigation systems or sprinklers;
- filling swimming pools;
- washing vehicles, except in a commercial car wash or as necessary for operator safety; and
- washing exterior building surfaces, parking lots, driveways or sidewalks, except as necessary to apply surface treatments such as paint, preservatives, stucco, pavement or cement.

The following uses may be allowed when mandatory restrictions are in place:

- irrigation to establish a new lawn and new plantings during the months of May and September;
- irrigation of public parks and recreational fields before 9 a.m. and after 5 p.m.;
- irrigation of gardens, flowers and ornamental plants by means of a hand-held hose or drip irrigation system; and
- irrigation of lawns by means of a hand-held hose.

Water uses NOT subject to mandatory restrictions are those required:

- for health or safety reasons;
- by regulation;
- for the production of food and fiber;
- for the maintenance of livestock; or
- to meet the core functions of a business (for example, irrigation by golf courses as necessary to maintain tees, greens, and minimal fairway watering, or irrigation by plant nurseries as necessary to maintain stock).

Notice of Seasonal Nonessential Outdoor Water Use Restrictions

Maynard shall notify its customers of the restrictions, including a detailed description of the restrictions and penalties for violating the restrictions, by April 15th each year.

Notice that mandatory restrictions have been put in place shall be filed with MassDEP within 14 days of the restriction's effective date. Filing shall be in writing on the form "Notification of Water Use Restrictions" available on the MassDEP website.

Maynard shall document compliance with the Seasonal Nonessential Outdoor Water Use Restrictions annually in its Annual Statistical Report (ASR).

Nothing in the permit shall prevent Maynard from implementing water use restrictions that are more stringent than those set forth in this permit.

7. Requirement to Report Raw and Finished Water Volumes

Maynard shall report annually on its ASR the raw water volumes and finished water volumes for the entire water system and the raw water volumes for individual water withdrawal points.

8. Water Conservation Requirements

At a minimum, Maynard shall implement the following conservation measures forthwith. Compliance with the water conservation requirements shall be reported to MassDEP upon request, unless otherwise noted below.

Table 5: Minimum Water Conservation Requirements
System Water Audits and Leak Detection
1. At a minimum, conduct a full leak detection survey every three years. A full leak detection survey should be completed by December 31, 2023.
2. Conduct leak detection of the entire distribution system within one year whenever the percentage of UAW increases by 5% or more (for example an increase from 3% to 8%) over the percentage reported on the ASR for the prior calendar year. Within 60 days of completing the leak detection survey, submit to MassDEP a report detailing the survey, any leaks uncovered as a result of the survey or otherwise, dates of repair and the estimated water savings as a result of the repairs.
3. Conduct field surveys for leaks and repair programs in accordance with the AWWA Manual 36.

System Water Audits and Leak Detection continued

4. Repair reports shall be kept available for inspection by MassDEP. The permittee shall establish a schedule for repairing leaks that is at least as stringent as the following:
   - Leaks of 3 gallons per minute or more shall be repaired within 3 months of detection.
   - Leaks of less than 3 gallons per minute at hydrants and appurtenances shall be repaired as soon as possible.
   - Leaks of less than 3 gallons per minute shall be repaired in a timely manner, but in no event more than 6 months from detection, except that leaks in freeway, arterial or collector roadways shall be repaired when other roadwork is being performed on the roadway.
   - Leaks shall be repaired in accordance with the permittee's priority schedule including leaks up to the property line, curb stop or service meter, as applicable.
   - Permittee shall have water use regulations in place that require property owners to expeditiously repair leaks on their property.

   The following exceptions may be considered:
   - Repair of leakage detected during winter months can be delayed until weather conditions become favorable for conducting repairs;* and
   - Leaks in freeway, arterial or collector roadways may be coordinated with other scheduled projects being performed on the roadway**.

   *Reference: MWRA regulations 360 CMR 12.09
   **Mass Highway or local regulations may regulate the timing of tearing up pavement to repair leaks.

Metering

1. Calibrate all source, treatment and finished water meters at least annually and report date of calibration on the ASR.
2. One hundred percent (100%) metering of the system is required. All water distribution system users shall have properly sized service lines and meters that meet AWWA calibration and accuracy performance standards as set forth in AWWA Manual M6 – Water Meters.
3. Maynard shall have an ongoing program to inspect individual service meters to ensure that all service meters accurately measure the volume of water used by its customers. The metering program shall include regular meter maintenance, including testing, calibration, repair, replacement and checks for tampering to identify and correct illegal connections. The plan shall continue to include placement of sufficient funds in the annual budget to calibrate, repair, or replace meters as necessary.

Pricing

1. Establish a water pricing structure that includes the full cost of operating the water supply system. Full cost pricing recovers all costs as applicable, including:
   - pumping and distribution equipment cost, repair and maintenance;
   - water treatment;
   - electricity;
   - capital investment, including planning, design and construction;

Pricing continued
• land purchase and protection; • debt service; • administrative costs including systems management, billing, accounting, customer service, service studies, rate analyses and long-range planning; • conservation program including audits, leak detection equipment, service and repair, meter replacement program, automated meter reading installation and maintenance, conservation devices, rebate program, public education program; • regulatory compliance; and staff salaries, benefits training and professional development.
2. Evaluate water rates in accordance with Special Condition 9 and adjust costs as needed.
3. Permittee shall not use decreasing block rates. Decreasing block rates which charge lower prices as water use increases during the billing period, are prohibited by M.G.L. Chapter 40 Section 39L.
4. Continue to implement quarterly water billing and implement more frequent meter reading and billing as soon as practicable.
Residential and Public Sector Conservation
1. Meet all standards set forth in the Federal Energy Policy Act, 1992, and the Massachusetts Plumbing Code.
2. Meter or estimate water used by contractors using fire hydrants for pipe flushing and construction.
3. Municipal buildings • Maynard reported that water saving devices have not been installed in Green Meadow School and the fire station. Maynard reported that the replacement of the school is expected within three years and the fire station is expected within 1.5 years. Maynard shall continue to ensure that water savings devices are installed in all municipal buildings as they are renovated and shall ensure water conserving fixtures and landscaping practices are incorporating into the design of new municipal capital projects.
Industrial and Commercial Water Conservation
1. Maynard shall ensure implementation of water conservation practices, including the installation of WaterSense compliant low flow plumbing fixtures where applicable, and low water use landscaping in all development proposals.
Public Education and Outreach
1. Within one year of the date of this permit, develop and implement a water conservation and education plan designed to educate water customers on ways to conserve water. Without limitation, the plan may include the following actions: • Include in bill stuffers and/or bills, a work sheet to enable customers to track water use and conservation efforts and estimate the dollar savings; • Public space advertising/media stories on successes (and failures); • Conservation information centers perhaps run jointly with electric or gas company; • Speakers for community organizations; • Public service announcements; radio/T.V./audio-visual presentations;

Public Education and Outreach continued
• Joint advertising with hardware stores to promote conservation devices; • Use of civic and professional organization resources; • Special events such as Conservation Fairs; • Develop materials that are targeted to schools with media that appeals to children, including materials on water resource projects and field trips; and • Provide multilingual materials as needed.
2. Within one year of the date of this permit, Maynard shall provide a report on the water conservation and public education plan it developed over the prior year and identify a summary of activities completed during the past year and those planned for the for the future to promote water conservation.

9. Minimization of Groundwater Withdrawal Impacts in Stressed Subbasins

Maynard shall minimize the impacts of its groundwater withdrawals from its permitted source in Subbasin 12033, as follows:

- Maynard shall continue to evaluate their water rate structure annually.
- Maynard shall continue to enforce the Water Rules and Regulations with regards to the requirements for moisture sensor and timing device installations on irrigation systems.
- Maynard shall continue to use an automated meter reading system.
- Maynard has regulations in place to protect the operation of fire hydrants and ensure their proper use. Maynard shall continue to enforce these regulations.

GENERAL CONDITIONS (applicable to all permittees)

1. **Duty to Comply:** The permittee shall comply at all times with the terms and conditions of this permit, the Act and all applicable State and Federal statutes and regulations.
2. **Operation and Maintenance:** The permittee shall at all times properly operate and maintain all facilities and equipment installed or used to withdraw up to the authorized volume so as not to impair the purposes and interests of the Act.
3. **Entry and Inspections:** The permittee or the permittee's agent shall allow personnel or authorized agents or employees of MassDEP at reasonable times to enter and examine any property or inspect and copy any records for the purpose of determining compliance with this permit, the Act or the regulations published pursuant thereto, upon presentation of proper identification and an oral statement of purpose.
4. **Water Emergency:** Withdrawal volumes authorized by this permit are subject to restriction in any water emergency declared by MassDEP pursuant to M.G.L. c. 21G, s. 15-17, M.G.L. c. 111, s. 160, or any other enabling authority.
5. **Transfer of Permits:** This permit shall not be transferred in whole or in part unless and until MassDEP approves such transfer in writing, pursuant to a transfer application on forms provided by MassDEP requesting such approval and received by MassDEP at least thirty (30) days before the effective date of the proposed transfer. No transfer application shall be deemed filed unless it is accompanied by the applicable transfer fee established by 310 CMR 36.33.
6. **Duty to Report:** The permittee shall submit annually, on the electronic Annual Statistical Report (eASR) accessed through MassDEP's eDEP website, a statement of the withdrawal. Such report must be submitted annually by the date identified on eDEP each year, unless the permittee has explicit permission from the MassDEP Drinking Water program for an extension of time.
7. **Duty to Maintain Records:** The permittee shall be responsible for maintaining withdrawal records in sufficient detail to assess compliance with the conditions of this permit.
8. **Metering:** All withdrawal points included within the permit shall be metered. Meters are to be calibrated annually.
9. **Amendment, Suspension or Termination:** MassDEP may amend, suspend or terminate the permit in accordance with M.G.L. c. 21G and 310 CMR 36.29.

APPEAL RIGHTS AND TIME LIMITS

This permit is a decision of MassDEP. Any person aggrieved by this decision and any person who has been allowed pursuant to 310 CMR 1.01(7) to intervene in the adjudicatory proceeding that resulted in this decision may request an adjudicatory hearing. Any such request must be made in writing, by certified mail or hand delivered, and received by MassDEP within twenty-one (21) days of the date of receipt of this permit. No request for an appeal of this permit shall be validly filed unless a copy of the request is sent by certified mail, or delivered by hand to the local water resources management official in the city or town in which the withdrawal point is located; and for any person appealing this decision, who is not the applicant, unless such person

notifies the permit applicant of the appeal in writing by certified mail or by hand within five (5) days of mailing the appeal to MassDEP.

CONTENTS OF HEARING REQUEST
The request for a hearing shall state specifically, clearly and concisely the facts which are the grounds for the appeal, the relief sought, and any additional information required by 310 CMR 1.01(6)(b) or other applicable law or regulation. For any person appealing this decision who is not the applicant, the request must include sufficient written facts to demonstrate status as a person aggrieved and documentation to demonstrate previous participation where required.

FILING FEE AND ADDRESS
The hearing request, together with a valid check, payable to the Commonwealth of Massachusetts in the amount of $100 must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

The request shall be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below.

EXEMPTIONS
The filing fee is not required if the appellant is a city or town (or municipal agency), county, district of the Commonwealth of Massachusetts, or a municipal housing authority.

WAIVER
MassDEP may waive the adjudicatory hearing filing fee for any person who demonstrates to the satisfaction of MassDEP that the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request, an affidavit setting forth the facts which support the claim of undue hardship.

Marielle Stone — August 26, 2021

Marielle Stone, Deputy Regional Director
Bureau of Water Resources
Central Regional Office

Date

Appendix A – Functional Equivalence with the 65 Residential Gallons Per Capita Day Performance Standard

MassDEP will consider PWS permittees who cannot meet the 65 RGPCD performance standard to be functionally equivalent, and in compliance with their permit, if they have an on-going program in place that ensures best practices for controlling residential water use as described below.

If the permittee fails to document compliance with the RGPCD performance standard in any Annual Statistical Report (ASR), then the permittee must file with that ASR a Residential Gallons Per Capita Day Compliance Plan (RGPCD Plan) which shall include, at a minimum:

1. A description of the actions taken during the prior calendar year to meet the performance standard;

2. An analysis of the cause of the failure to meet the performance standard;

3. A description of the actions that will be taken to meet the performance standard which must include, at a minimum, at least one of the following:
    a) a program that provides water saving devices such as faucet aerators and low flow shower heads at cost;
    b) a program that provides rebates or other incentives for the purchase of low water use appliances (washing machines, dishwashers, and toilets), or
    c) the adoption and enforcement of an ordinance, by-law or regulation to require the installation of moisture sensors or similar climate related control technology on all automatic irrigation systems;

    and may include, without limitation, the following:
    d) the use of an increasing block water rate or a seasonal water rate structure as a tool to encourage water conservation;
    e) a program that provides rebates or other incentives for the installation of moisture sensors or similar climate related control technology on automatic irrigation systems;
    f) the adoption and enforcement of an ordinance, by-law or regulation to require that all new construction include water saving devices and low water use appliances;
    g) the adoption and enforcement of an ordinance, by-law or regulation to require that all new construction minimize lawn area and/or irrigated lawn area, maximize the use of drought resistant landscaping, and maximize the use of top soil with a high water retention rate;
    h) the implementation of a program to encourage the use of cisterns or rain barrels for outside watering;
    i) the implementation of monthly or quarterly billing.

4. A schedule for implementation; and

5. An analysis of how the planned actions will address the specific circumstances that resulted in the failure to meet the performance standard.

If the permittee is already implementing one or more of these programs, it must include in its RGPCD plan the continued implementation of such program(s), as well as implementation of at least one additional program. All programs must include a public information component designed to inform customers of the program and to encourage participation in the program.

RGPCD plans may be amended to revise the actions that will be taken to meet the performance standard. Amended RGPCD plans must include the information set forth above.

If a RGPCD plan is required, the permittee must:

1. submit information and supporting documentation sufficient to demonstrate compliance with its RGPCD plan annually at the time it files its ASR, and
2. continue to implement the RGPCD plan until it complies with the performance standard and such compliance is documented in the permittee's ASR for the calendar year in which the standard is met.

Appendix B – Functional Equivalence with the 10% Unaccounted for Water (UAW) Performance Standard

MassDEP will consider PWS permittees who cannot meet the 10% UAW performance standard to be functionally equivalent, and in compliance with their permit, if they have an on-going program in place that ensures "best practices" for controlling water loss. The water loss control program will be based on annual water audits and guidance as described in the AWWA/IWA *Manual of Water Supply Practices – M36, Water Audits and Loss Control Programs* (AWWA M36).

If the permittee fails to document compliance with the UAW performance standard (UAW of 10% or less for 2 of the 3 most recent years throughout the permit period), then the permittee shall develop and implement a water loss control program following the *AWWA M36 Water Audits and Loss Control Programs* within 5 full calendar years of failing to meet the standard as follows:

1. Conduct an annual "top down" water audit, calculate the data validity level/score using AWWA Water Loss Control Committee's Free Water Audit Software, and submit the AWWA WLCC Free Water Audit Software: Reporting Worksheet and data validity score annually with its Annual Statistical Report (ASR).
   - If a PWS's data validity level/score is less than Level III (51-70), steps recommended through the audit(s) shall be taken to improve the reliability of the data prior to developing a long-term program to reduce real and apparent water losses.
   - Data with a validity score of 50 or less are considered too weak to be used to develop a component analysis or for infrastructure planning and maintenance.
   - Developing data with an acceptably strong validity score can be a multi-year process.
2. When the data validity score meets the Level III (51-70) requirement, conduct a component analysis to identify causes of real and apparent water loss and develop a program to control losses based on the results of the component analysis.
3. Within 5 full calendar years of failing to meet the standard, submit the component analysis and water loss control program with a proposed implementation schedule to MassDEP.
4. Continued implementation will be a condition of the permit in place of meeting the 10% UAW performance standard.
5. Upon request of MassDEP, the permittee shall report on its implementation of the water loss control program.

A PWS permittee may choose to discontinue the water loss program implementation if UAW, as reported on the ASR and approved by MassDEP, is below 10% for four consecutive years, and the water audit data validity scores are at least Level III (51-70) for the same four years.

NOTE FOR SMALL SYSTEMS: For small systems with less than 3,000 service connections or a service connection density of less than 16 connections per mile of pipeline, the Unavoidable Annual Real Loss (UARL) calculation and the Infrastructure Leak Index (ILI) developed as the final steps of the top down water audit may not result in valid performance indicators, and may not be comparable to the UARL and ILI calculations for larger systems.

However, these small systems can benefit from developing reliable data and conducting an annual top down water audit. Small systems can rely on the real losses (gallons per mile of main per day) performance indicator developed in the water audit as a measure of real water loss when developing a water loss control program. The M36 Manual discusses the audit process for small systems, and includes a chapter to guide small systems in understanding the results of their audits and in developing a water loss control program (*Manual of Water Supply Practices – M36, Fourth Edition, Chapter 9: Considerations for Small Systems*, pp. 293-305).

MassDEP UAW Water Loss Control Measures: If the permittee is required to develop a Functional Equivalence Plan for the 10% Unaccounted for Water Performance Standard, and the permittee does not have a MassDEP-approved Water Loss Control Program in place within 5 full calendar years of failing to meet the standard, the permittee will be required to implement the MassDEP UAW Water Loss Control Measures outlined below:

- An annual water audit and leak detection survey, as described in the AWWA M36 Manual, of the entire system.
  - Within one year, repair 75% (by water volume) of all leaks detected in the survey that are under the control of the public water system;
  - Thereafter, repair leaks as necessary to reduce permittee's UAW to 10% or the minimum level possible.
- Meter inspection and, as appropriate, repair, replace and calibrate water meters:
  - Large Meters (2" or greater) – within one year
  - Medium Meters (1" or greater and less than 2") – within 2 years
  - Small Meters (less than 1") - within three years
  - Thereafter, calibrate and or replace all meters according to type and specification.
- Bill at least quarterly within three years.
- Water pricing structure sufficient to pay the full cost of operating the system.

Hardship - A permittee may present an analysis of the cost-effectiveness of implementing certain conservation measures included in the MassDEP UAW Water Loss Control Measures and offer alternative measures. Any analysis must explicitly consider environmental impacts and must produce equal or greater environmental benefits.

A permittee's hardship analysis shall:

- Document economic hardship and present an analysis demonstrating that implementation of specific measures will cause or exacerbate significant economic hardship;
- Present reasons why specific measures are not cost-effective because the cost would exceed the costs of alternative methods of achieving the appropriate standard; and
- Propose specific conservation measures that would result in equal or greater system-wide water savings or equal or greater environmental benefits than the conservation measures included in the MassDEP UAW Water Loss Control Measures.

MassDEP will review a permittee's detailed, written analysis to determine whether unique circumstances make specific Best Management Practices (BMPs) less cost-effective than alternatives, or infeasible for the permittee.

Appendix B ROCKLAND AVENUE BEDROCK TEST WELL 1 EVALUATION MEMO (VERDANTAS)

30 Shrewsbury Street
Holden, MA 01520

August 1, 2025

Garry F. McCarthy, P.E
Stantec Consulting Services
45 Network Drive 3rd Floor
Burlington, MA 01803

RE: Bedrock Test Well 1 Evaluation
Rockland Avenue – Maynard, MA
Verdantas Project# 26750

Verdantas LLC (Verdantas) is pleased to present this summary letter to assist in determining the viability for permitting Bedrock Test Well 1 (the Well) at the Rockland Avenue wellsite in Maynard, Massachusetts per Task 1 of the *Work Authorization for Hydrogeologic Services Revised,* dated October 28, 2024.

Background

Bedrock Test Well 1 is located approximately 415 feet north of Rockland Avenue and was drilled in April 1999 to a depth of 123 feet when drilling was discontinued because of loose rock falling into the borehole. In August 1999, a 6-inch casing was set to 125 feet below ground surface (bgs) and the Well was deepened to 363 feet bgs. Reference Attachment A for the Bedrock Test Well 1 log. Although the estimated yield of Bedrock Well 1 was 150 gallons per minute (GPM), the Well was not included in the combined pumping test of Wells 2, 3 and 5 in March 2000. Wells 2, 3, and 5 became the production wells at Rockland Avenue and Well 1 was left dormant. To evaluate the current condition of the Well, Verdantas subcontracted Maher Services, Inc (Maher) of North Reading, MA to inspect the Well using geophysical methods. Maher then conducted an 8-hour preliminary pumping test to assist in evaluating hydrologic conditions.

Well Condition

In March 2025, Maher used down-hole geophysical survey methods to assess Bedrock Test Well 1 conditions including conventional caliper measurements, ambient groundwater flow measurements, and acoustic televiewer plots.

Three zones of caliper enlargement concurrent with ambient groundwater flow were apparent in the caliper log. The first zone (Fracture Zone 1) is from approximately 125 to 135 feet bgs. Upward ambient groundwater flow appeared to outflow from the borehole in this zone. The second caliper enlargement zone (Fracture Zone 2) is from approximately 161 to 175 feet bgs. Significant groundwater inflow was apparent from 168.5 to 183 feet with limited outflow at 163 to 168.5 feet bgs (within fracture zone). Inflow was also apparent above the fracture zone from 152 to 163 feet bgs indicating ambient groundwater flow from Fracture Zone 2 to the shallower

Fracture Zone 1. The third fracture zone (Fracture Zone 3) is from approximately 187 to 200 feet bgs. Ambient inflow was apparent from 195.5 to 202 feet bgs and outflow was apparent from 189 to 195.5 feet. Only minor apparent fractures and ambient flow measurements exist below 200 feet bgs and only minor ambient flows were measured.

The acoustic televiewer plot showed similar conditions of potential fracture zones as the caliper log. Reference Attachment B for Geophysical Logs.

Preliminary Pumping Test

Maher conducted the 8-hour preliminary pumping test on June 12, 2025, with a pumping rate of 100 GPM. The pumping rate of 100 GPM was the highest pumping rate achievable for a pump that could fit into the 6-inch casing of the Well. Manual gauging was performed on the Well throughout pumping and over half an hour of recovery. Static depth to water prior to starting the test was 16.46 feet bgs and the depth to water at the end of pumping was 109.98 feet giving a total drawdown of 93.52 feet over 8 hours of pumping. Over the last 120 minutes of pumping the drawdown rate was 0.145 feet per hour. The 30-minute recovery reading measured groundwater at 58.23 feet bgs.

Per Massachusetts *Guidelines for Public Water Systems* section 4.3.1.4(5)(f)(1), to determine stabilization of a bedrock product well with a planned yield of 100,000 gallons per day (GPD) or greater the drawdown data from the final days of the pumping test must be plotted on a semi-log scale and extrapolated over a 180-day period and the projected drawdown must show 10% of the water column to remain above the pump intake (with a minimum of 15 feet) and a minimum of 35 feet of borehole must be maintained below the top of the pump. Using these standards, the last 120 minutes of drawdown observed during the preliminary pumping test were projected out to 180 days and indicated depth to water to be approximately 116 feet. Considering the extent of the water column during the preliminary pumping test (approximately 350 feet), a projected depth to water of 116 feet leaves significant room for additional drawdown while staying within stabilization standards. Additionally, with apparent water bearing fracture zones (as discussed above) at 125 to 135, 161 to 175, and 187 to 200 feet bgs additional drawdown could be accomplished without drawing below the water bearing zones. Note that DEP will only approve 75% of the test rate for a final yield. Reference Attachment C for pumping test drawdown charts and gauging data.

Water Quality Results

Water quality samples were collected at the end of the 8-hour preliminary pumping test for secondary constituents, arsenic, volatile organic compounds, and PFAS. Sample results indicated exceedances of respective standards for iron, manganese, and arsenic. There were also detections of methyl tert-butyl ether (MTBE) and toluene below standards. Total dissolved solids were detected slightly below standard. Hardness was detected at 263 mg $CaCO_3$/L, alkalinity was 70 mg $CaCO_3$/L, and pH was within standard range at 6.68 SU indicating very hard and moderately aggressive water. PFAS detections and the hazard index calculation were below

proposed standards. Due to exceedances of iron, manganese, and arsenic and water hardness treatment of source water would be required for a final production well. Reference Attachment D for a water quality summary table and Attachment E for the laboratory report.

Recommendations

We estimate a yield of approximately 0.25 million gallons per day (MGD) could be achievable with an 8-inch replacement well. The preliminary pumping test suggests that the fractures at Well 1 could sustain perhaps 235 GPM for 10 days which would allow an approvable yield of 175 GPM. Considering project economics and desired groundwater yields, we recommend drilling a replacement well directly adjacent to the existing well for the highest likelihood to encounter similar bedrock conditions and well dynamics, conducting well development, and an additional preliminary pumping test to confirm the viability of the replacement well. Using these initial pumping test results, a more accurate estimate of the replacement well's potential approvable yield can be established to support the decision to pursue DEP permitting.

If you have questions regarding the information presented, please contact us at the numbers below.

Sincerely,
VERDANTAS LLC

Landon D. Glynn
Hydrogeologist III
(978) 506-5057

David G. Harwood, P.G., L.G.
Senior Hydrogeologist
(978) 506-5064

Attachments

- Attachment A – Well Log
- Attachment B – Geophysical Logs
- Attachment C – Pumping Test Drawdown Charts and Gauging Data
- Attachment D – Water Quality Summary Table
- Attachment E – Laboratory Water Quality Report

File Path: Stantec\26750 - Maynard Rockland Ave Wells\Working\Rock Well 1\26750_2025-08-01_Summary Letter.docx

ATTACHMENT A

WELL LOG

Well #1

D.L. MAHER COMPANY
P.O. BOX 127
71 Concord Street
North Reading, MA 01864
(617) 933-3210

JOB NO. 99-089-RW DRILLER Jim Ash

MACHINE NO. CP650 DATE STARTED 4/12/99

DATE COMPLETED 4/ /99

NAME Maynard MASS. D+H Gary McCarthy

MAILING ADDRESS

WELL DRILLED AT off RT 27 Maynard MA soccer Fields

DEPTH OF WELL 123' - drilled 6" reamed To 8" 42' drilling in rock

DEPTH TO LEDGE 45' soft + rotten Till 78'

FEET OF PIPE set 82' - 8" casing T+C + 8" drive shoe c/B grout rock socket

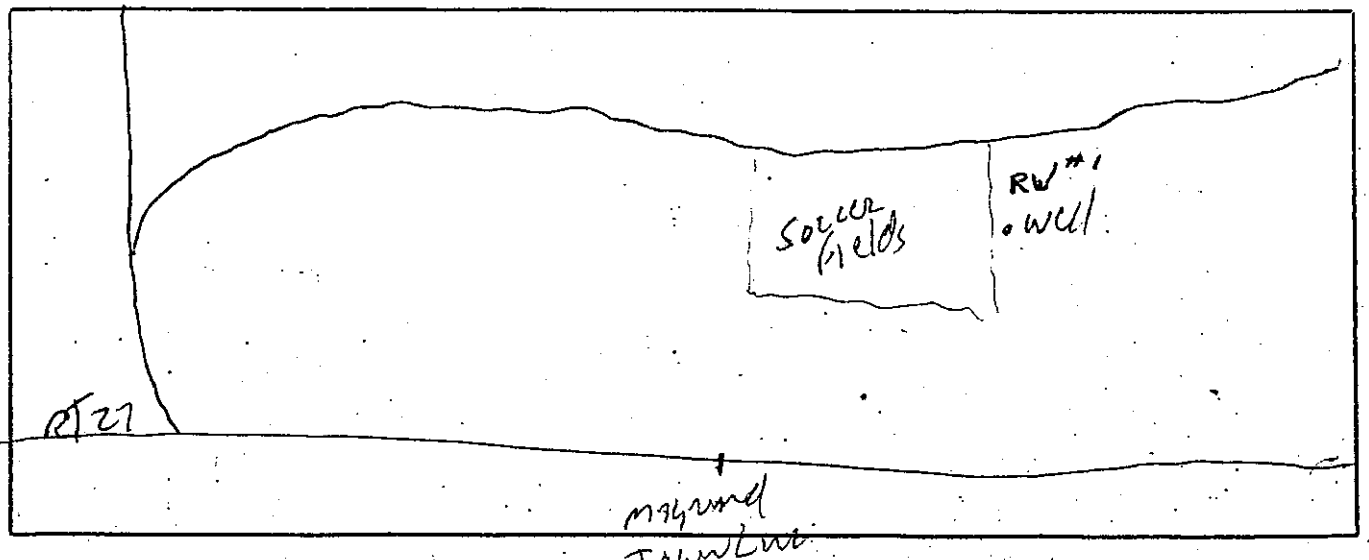
STATIC WATER LEVEL 1'

GALLONS PER MINUTE 180 gpm ±

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher Co., North Reading, MA. Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



RIG I LOCATION: Sill

CUSTOMER: Maynard NH

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Medium Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
								set 82'-8" casing	
0'-45'	6 minutes	silt 45'-78'	1950	250	soft Broken gray rock 78'-81'	7	-0-	gray rock	
81'-83'	2	—		1	soft	7	20 gpm	gray-	seam 95' dirty
83'-103'	20	8 min		250	soft	7		soft + dirty gray	Broken
103'-123'	20	→ ?						seam	115'-130'
					(seam 115-130' caving in can't set by)				

Well #11

Well #1

D.L. MAHER CO.
P.O. Box 127
71 Concord Street
North Reading, MA 01864

Job No. 99-089-RW Driller Jim Ash

Machine No. CP650 Date Started 8/17/99

Date Completed 8/18/99

Name Maynard MA

Mailing Address

Well Drilled At Well #1 Rockland Street

Depth of Well 125' set 6" casing deepen 125'-363'

Depth to Ledge 40'-~~65~~

Feet of Pipe 60'-8" casing 126'-6" casing

Static Water Level 4'

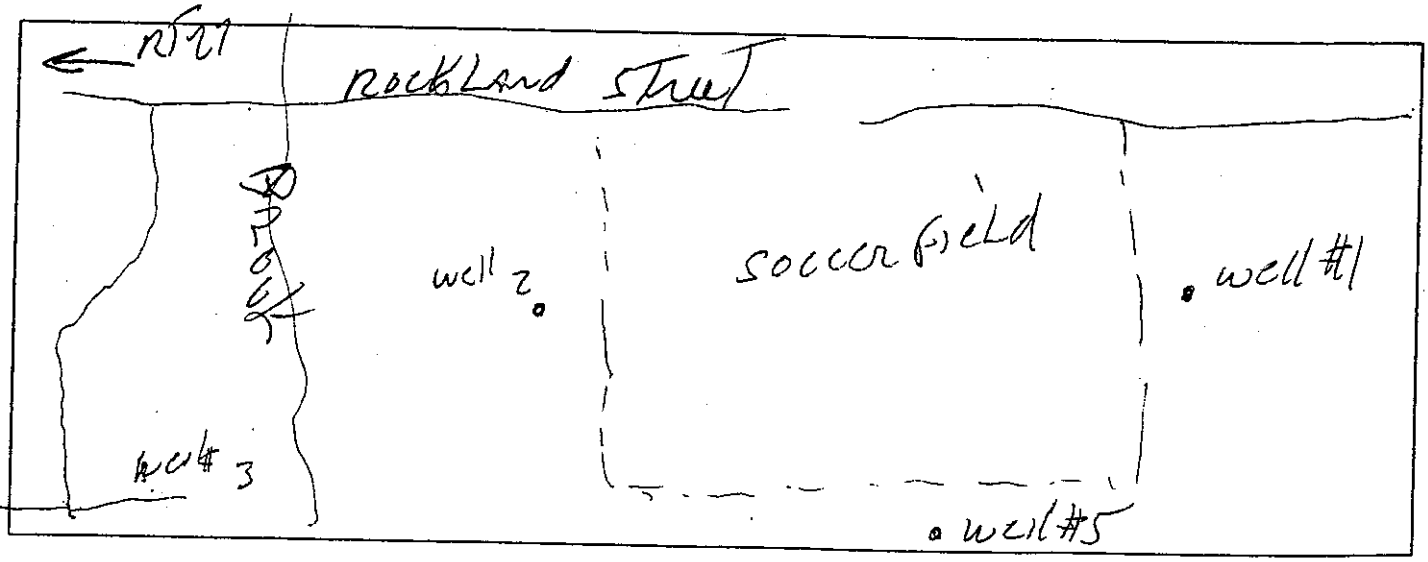
Gallons per Minute 150 (125-363) 9pm 125-150 9pm (60'-125')

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher co., North Reading, MA.

Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



Drilling Log

Customer: Maynard Location: silc #1 Date: 8/16/99

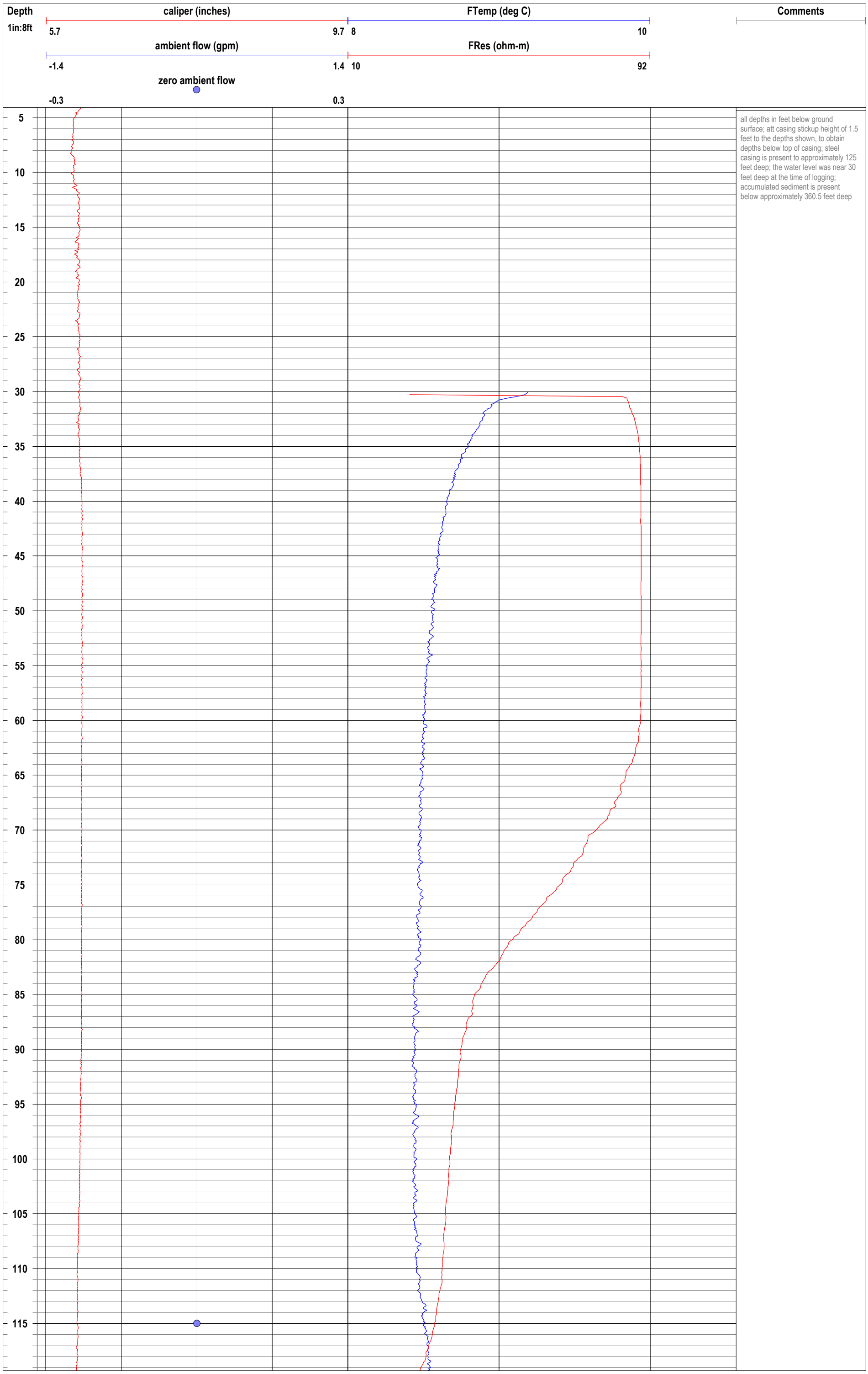
Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
well 125' deep		caved in To 115'			clean out	To 125'	set 6"	Casing 125'	
					soft	4	0		
125-143	18	—	1450	240	soft		15	white	seam 138'.
143-163	20	21		1	soft	4	15	white	
163-183	20	24		250	soft md	1	50gpm	white/Black	seam 170-175
183-203	20	—		1	md-		75gpm	white-Black	185 seam
203-222	20	30		1	md	4	75	gray	
223-243	20	30		260	med	1	75-100?	gray	
243-263	20	40			med	4	1	gray	290'
263-283	20	40			med		1	gray white	
283-303	20	45			med		75-100	white	
303-323	20	50			med			gray	
323-343	20	60			med			gray	
343-363	20	62			med		100+	gray	

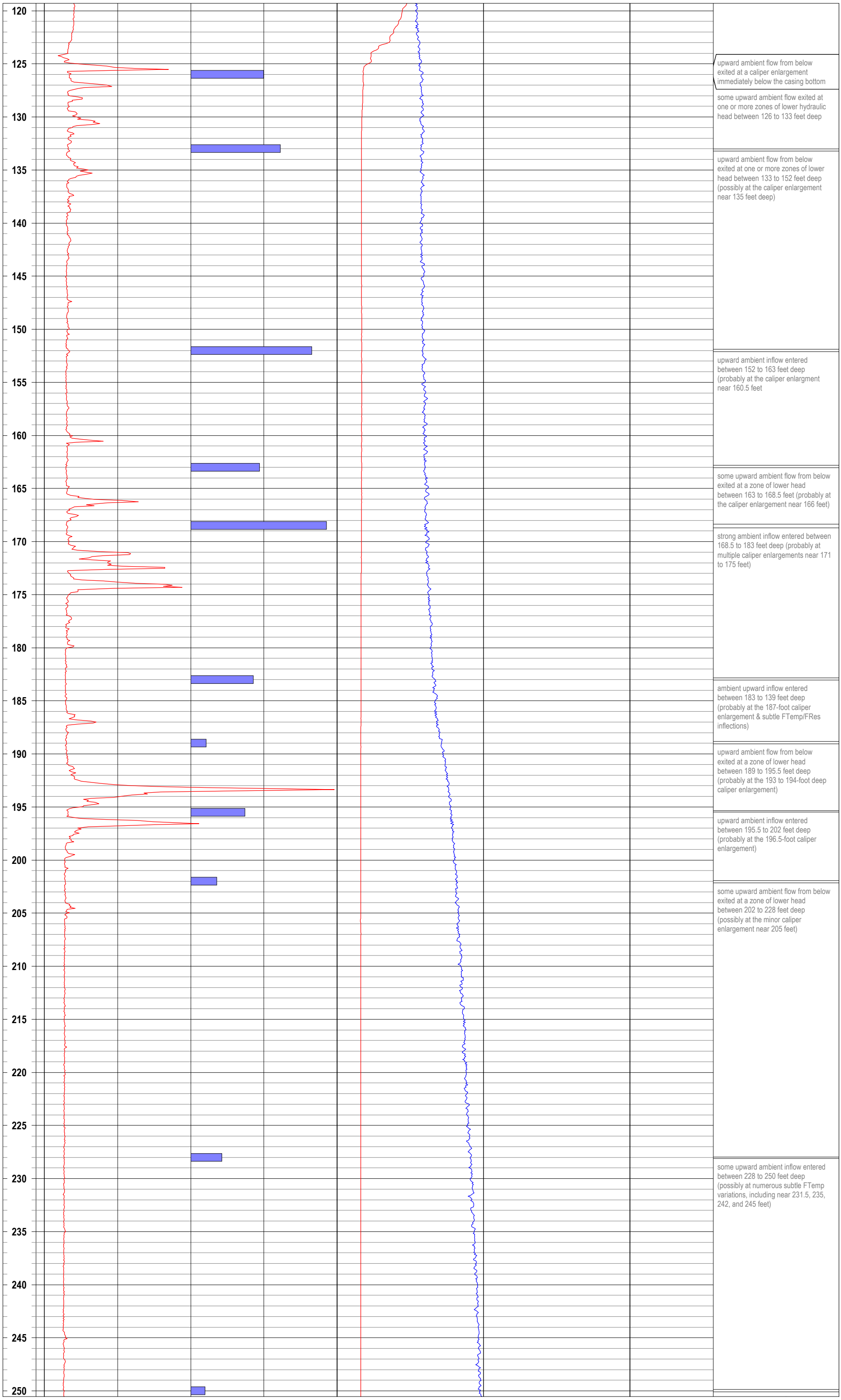
well #2

ATTACHMENT B

GEOPHYSICAL LOGS

Maher Services / Maynard MA - Well RW-1 conventional log plot

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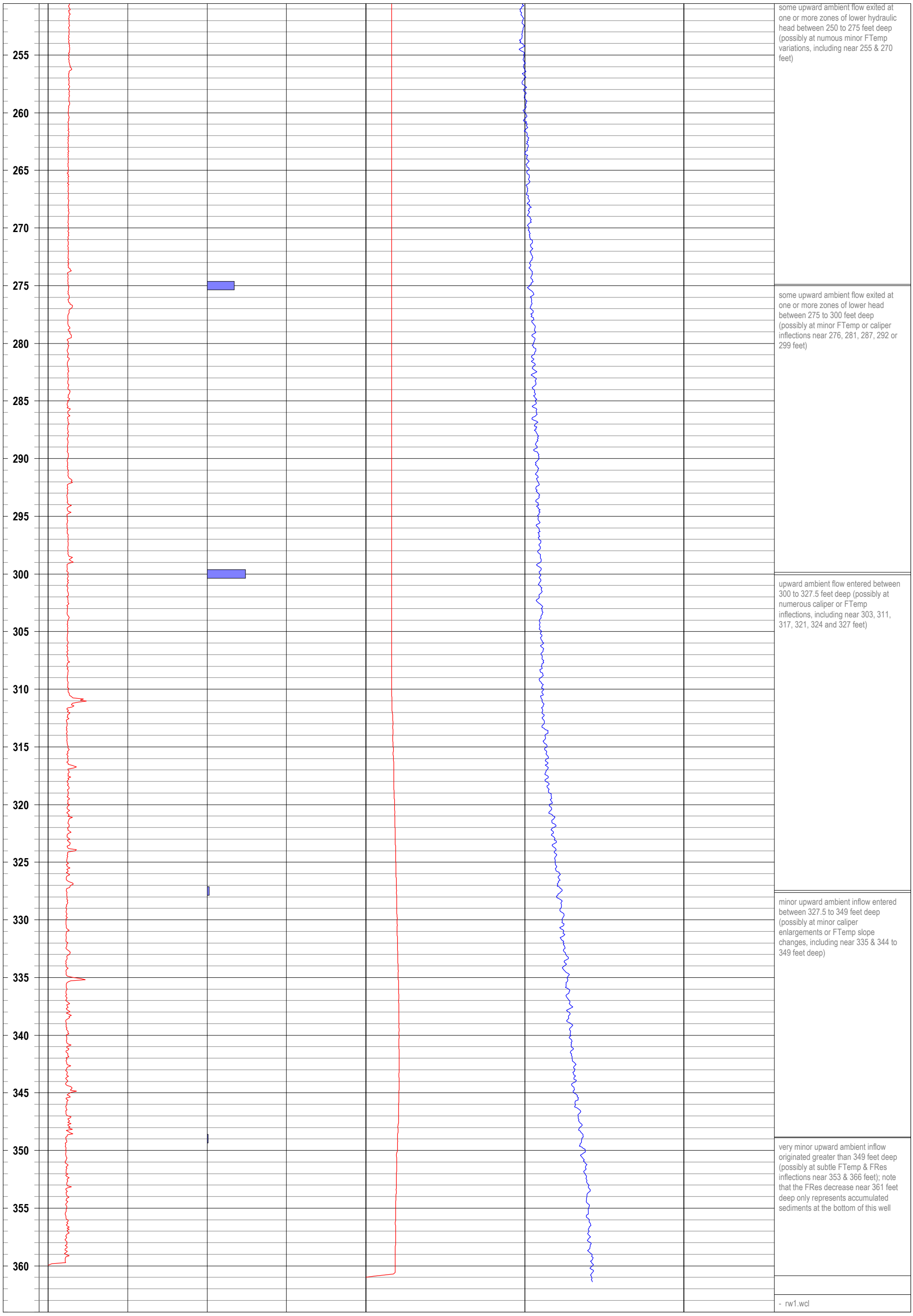
225
230
235
240
245
250
upward ambient flow from below exited at a caliper enlargement immediately below the casing bottom
some upward ambient flow exited at one or more zones of lower hydraulic head between 126 to 133 feet deep
upward ambient flow from below exited at one or more zones of lower head between 133 to 152 feet deep (possibly at the caliper enlargement near 135 feet deep)
upward ambient inflow entered between 152 to 163 feet deep (probably at the caliper enlargment near 160.5 feet
some upward ambient flow from below exited at a zone of lower head between 163 to 168.5 feet (probably at the caliper enlargement near 166 feet)
strong ambient inflow entered between 168.5 to 183 feet deep (probably at multiple caliper enlargements near 171 to 175 feet)
ambient upward inflow entered between 183 to 139 feet deep (probably at the 187-foot caliper enlargement & subtle FTemp/FRes inflections)
upward ambient flow from below exited at a zone of lower head between 189 to 195.5 feet deep (probably at the 193 to 194-foot deep caliper enlargement)
upward ambient inflow entered between 195.5 to 202 feet deep (probably at the 196.5-foot caliper enlargement)
some upward ambient flow from below exited at a zone of lower head between 202 to 228 feet deep (possibly at the minor caliper enlargement near 205 feet)
some upward ambient inflow entered between 228 to 250 feet deep (possibly at numerous subtle FTemp variations, including near 231.5, 235, 242, and 245 feet)



some upward ambient flow exited at one or more zones of lower hydraulic head between 250 to 275 feet deep (possibly at numous minor FTemp variations, including near 255 & 270 feet)

some upward ambient flow exited at one or more zones of lower head between 275 to 300 feet deep (possibly at minor FTemp or caliper inflections near 276, 281, 287, 292 or 299 feet)

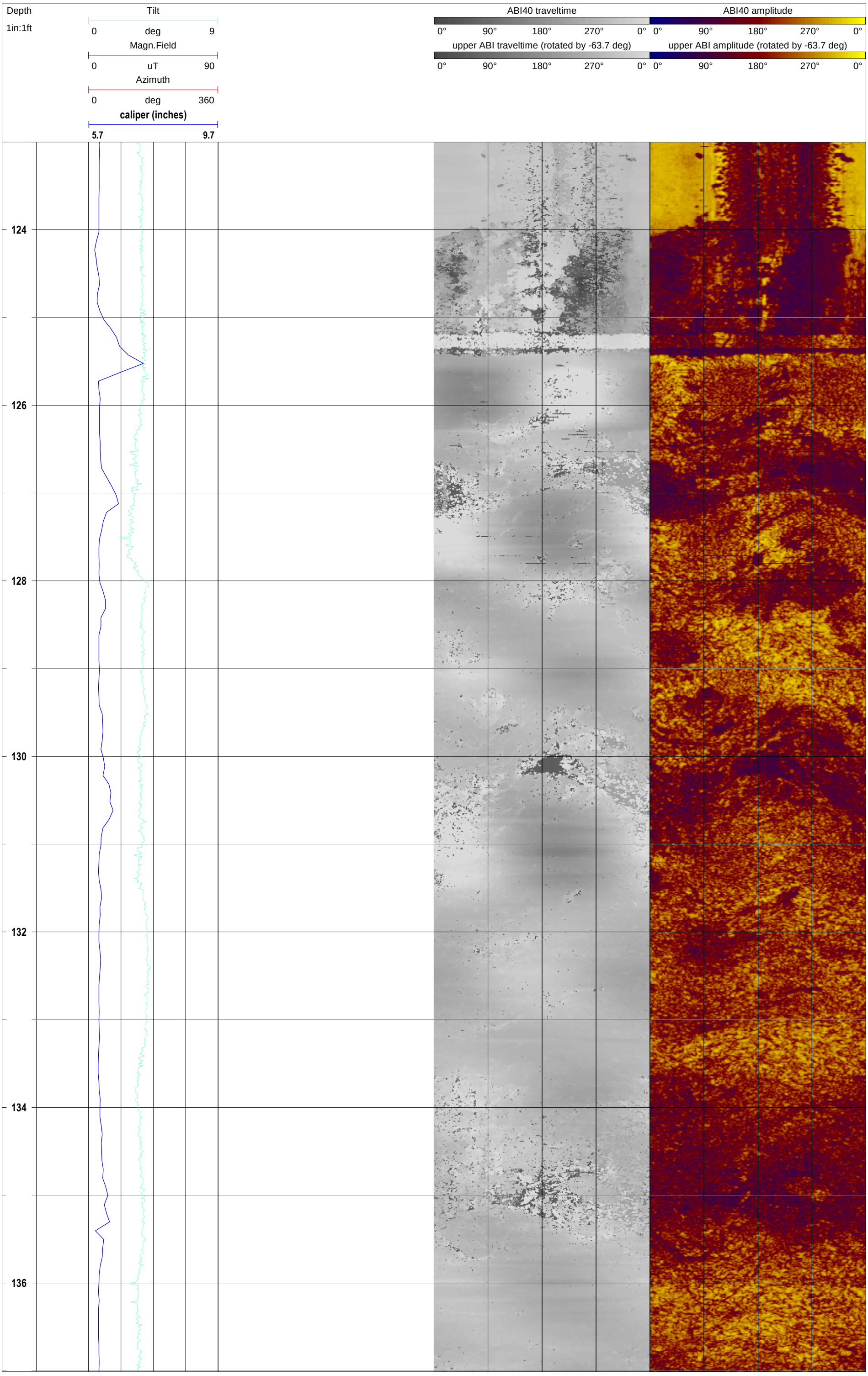
upward ambient flow entered between 300 to 327.5 feet deep (possibly at numerous caliper or FTemp inflections, including near 303, 311, 317, 321, 324 and 327 feet)

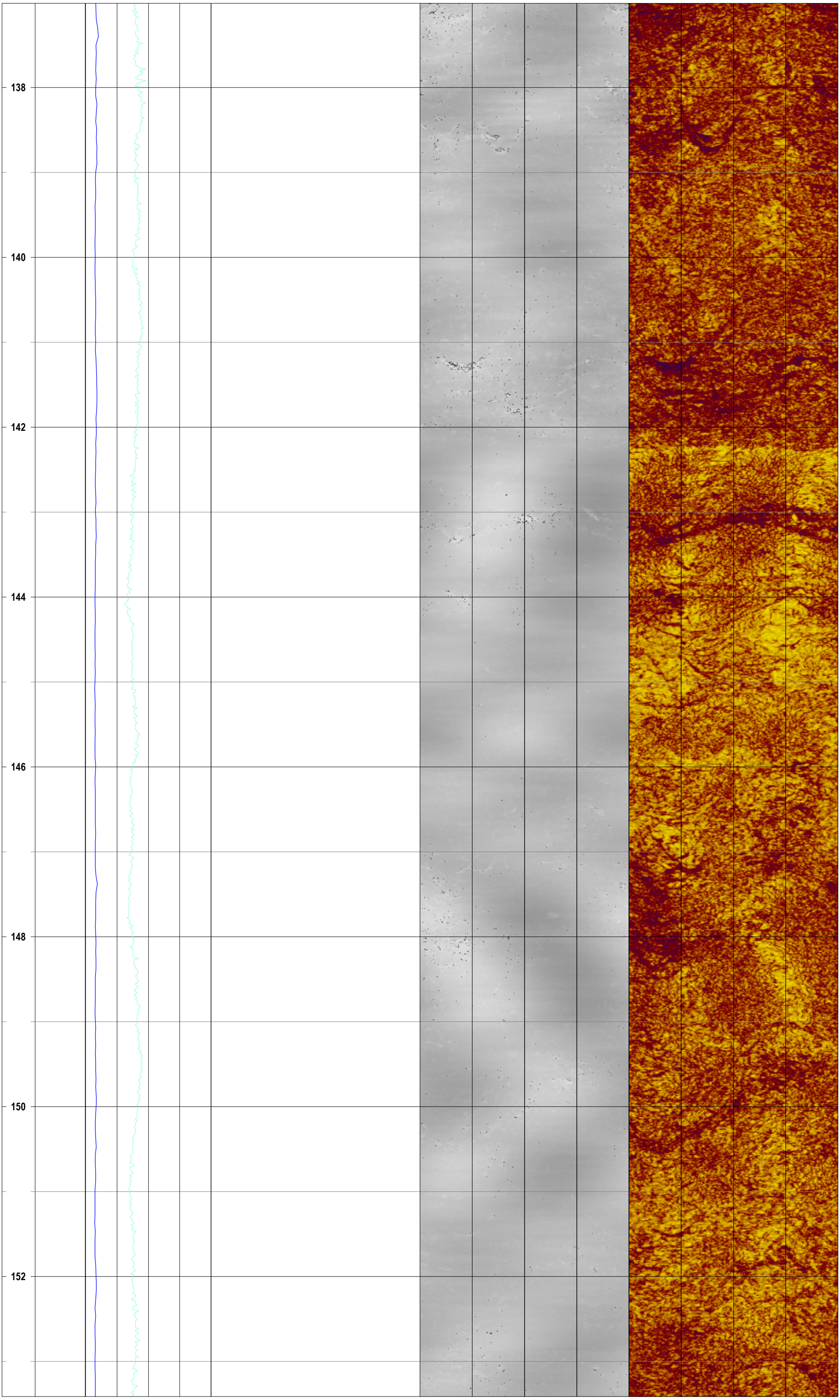
minor upward ambient inflow entered between 327.5 to 349 feet deep (possibly at minor caliper enlargements or FTemp slope changes, including near 335 & 344 to 349 feet deep)

very minor upward ambient inflow originated greater than 349 feet deep (possibly at subtle FTemp & FRes inflections near 353 & 366 feet); note that the FRes decrease near 361 feet deep only represents accumulated sediments at the bottom of this well

- rw1.wcl

Maher Services / Maynard MA - Well RW-1 acoustic televiewer log plot

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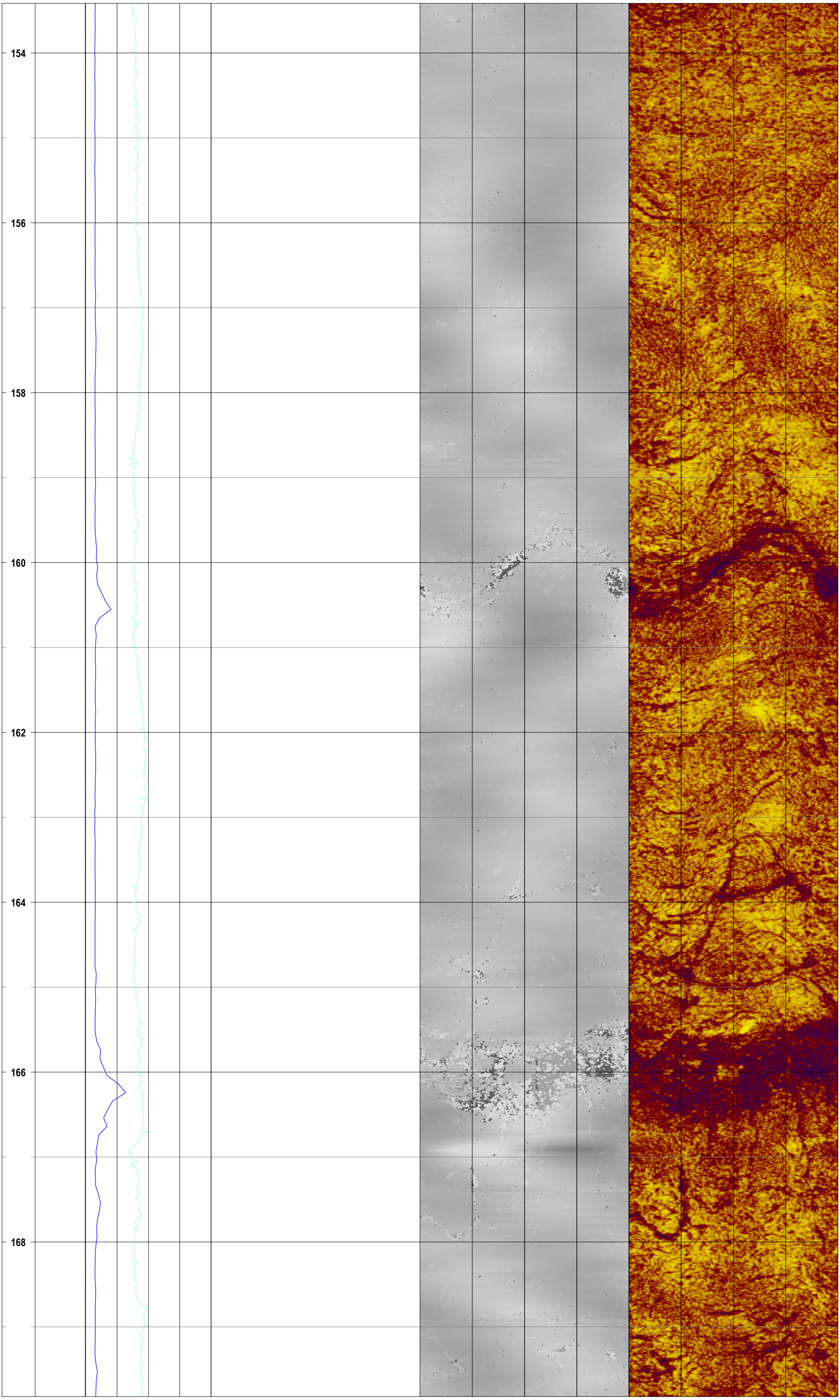
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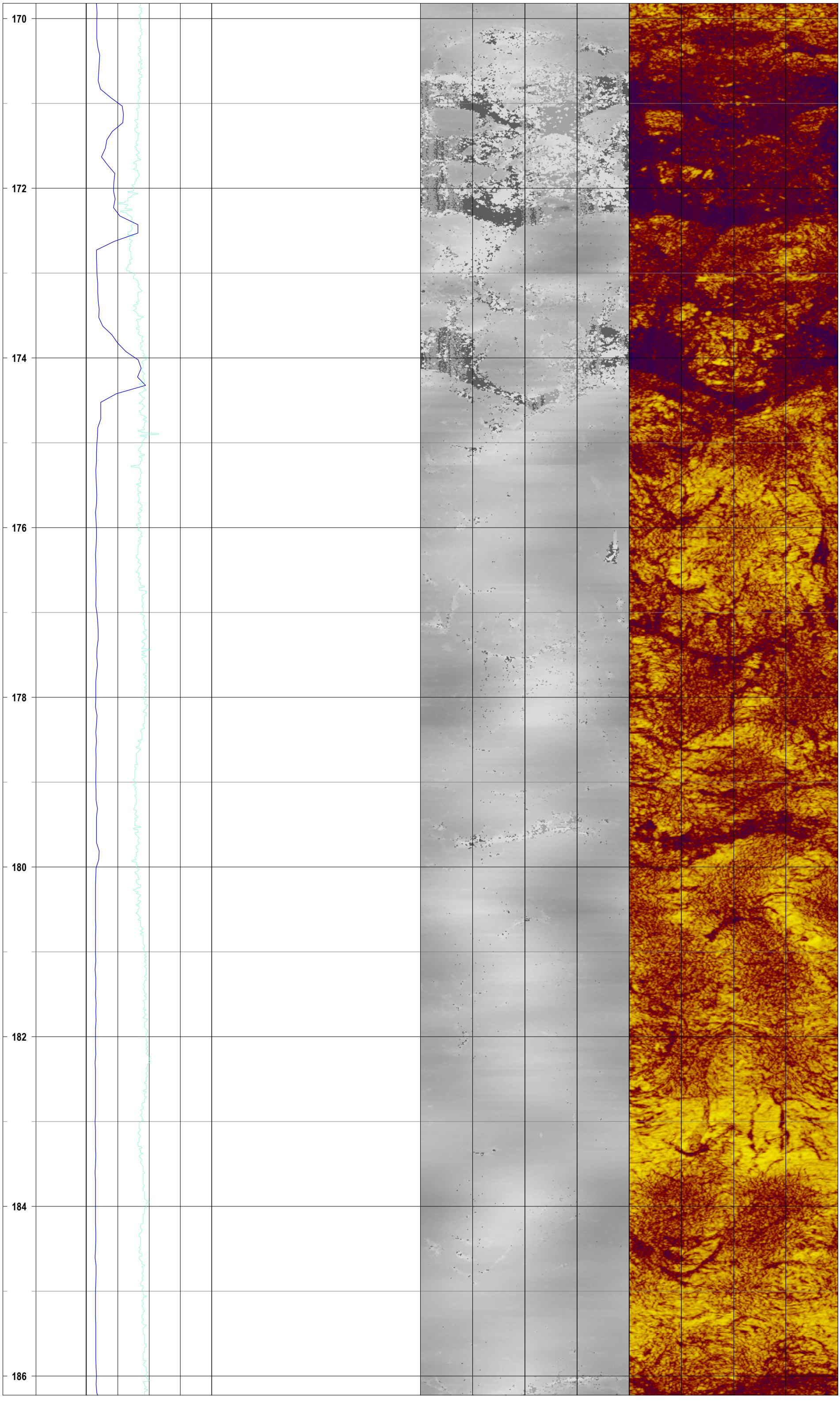
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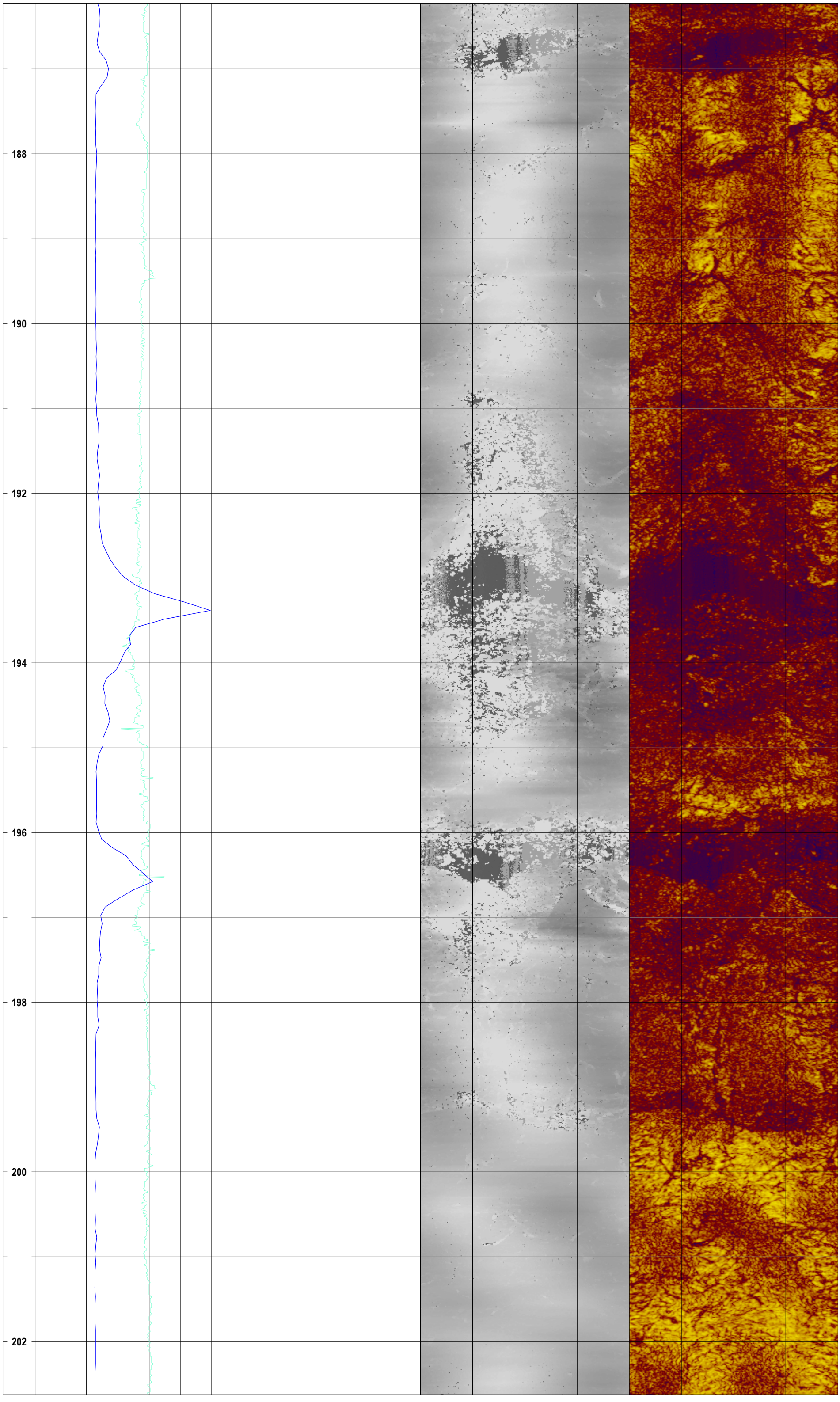
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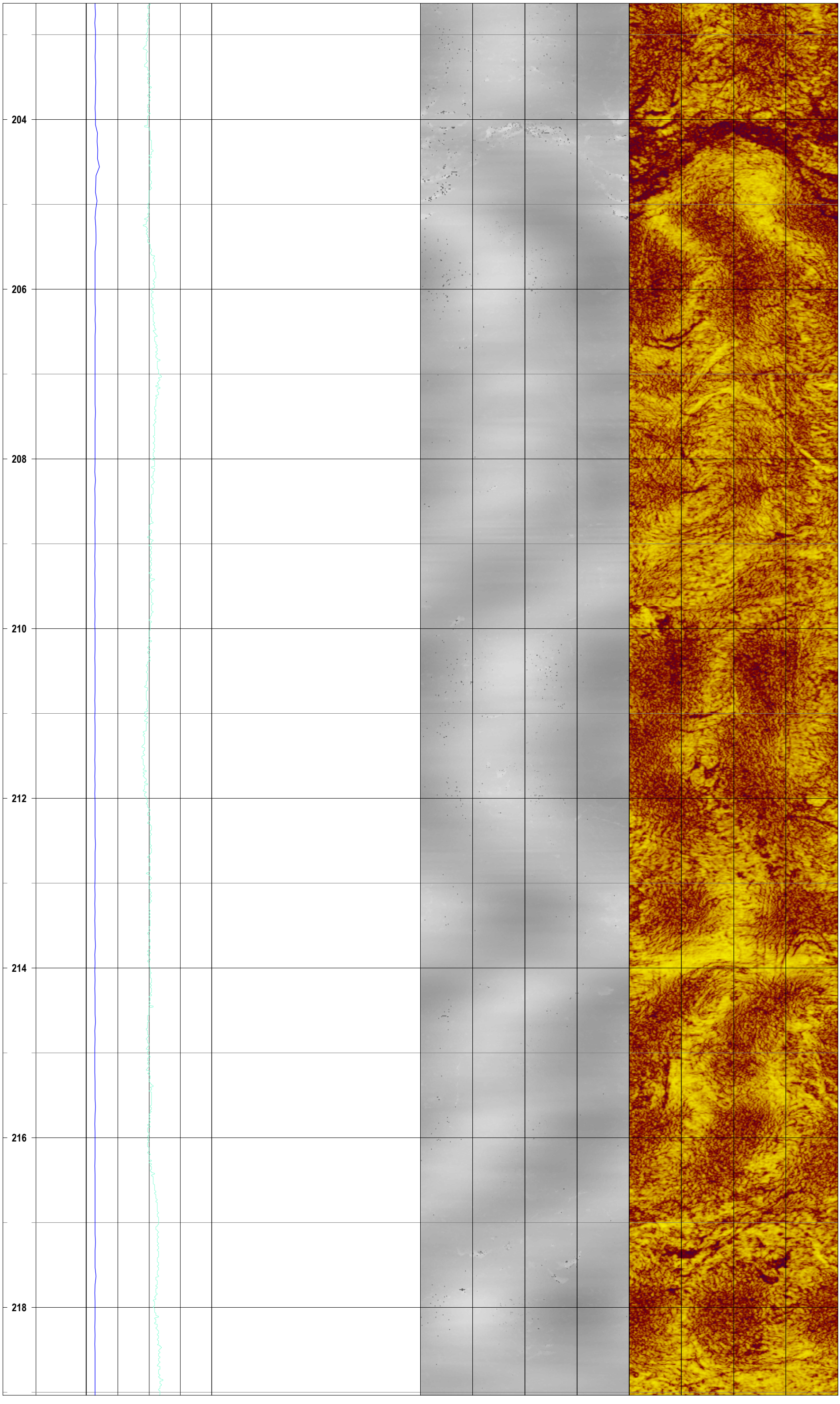
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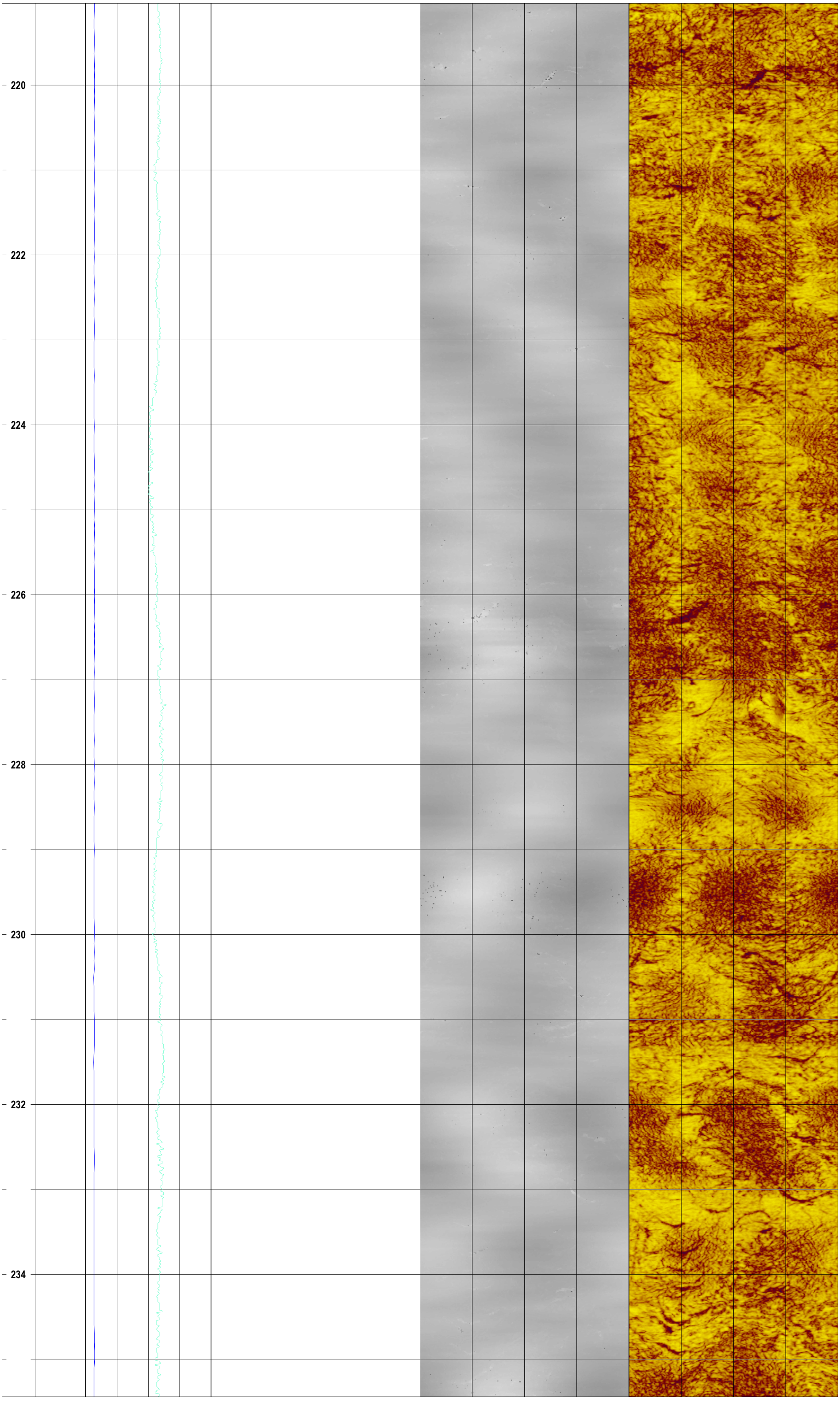
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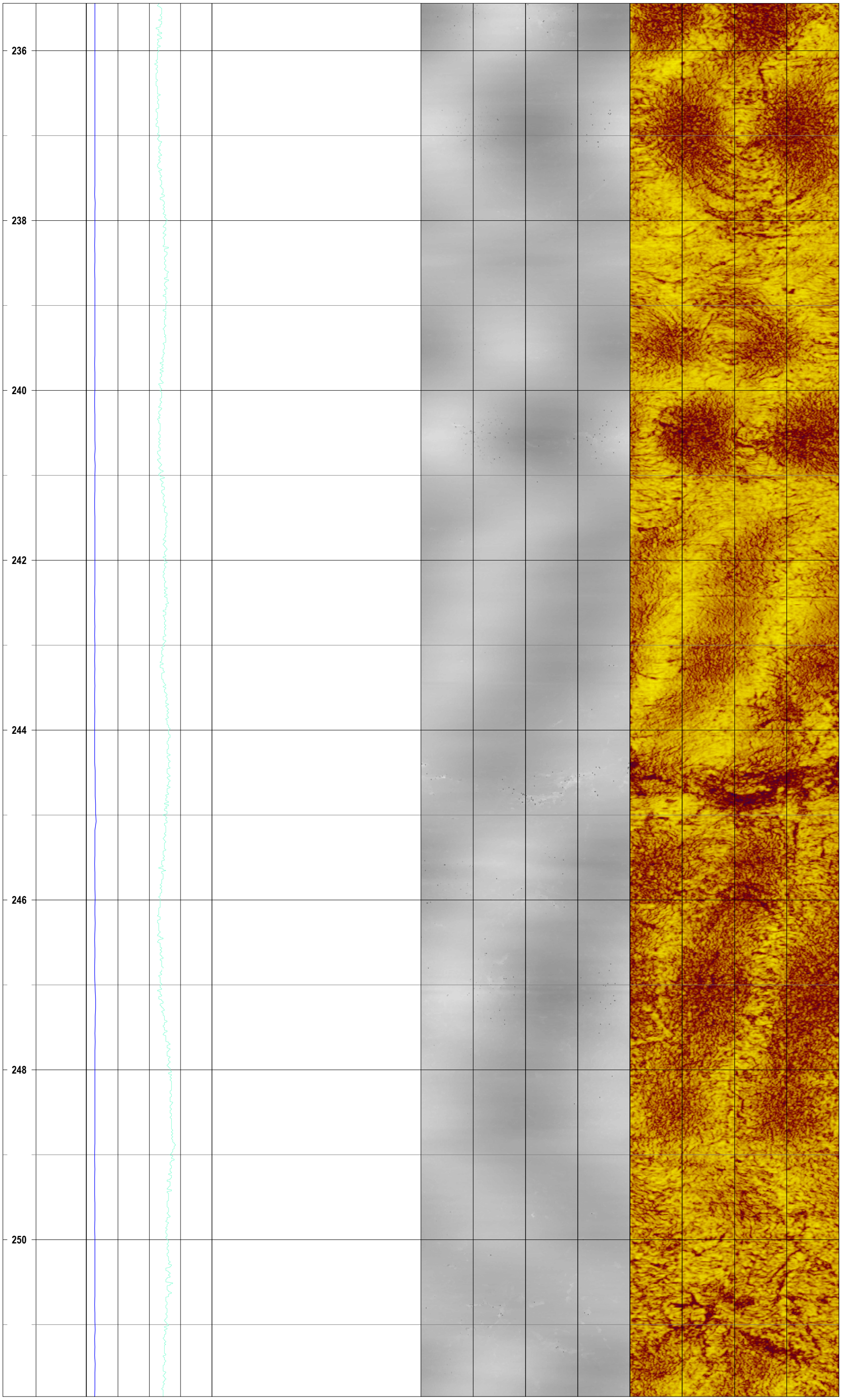
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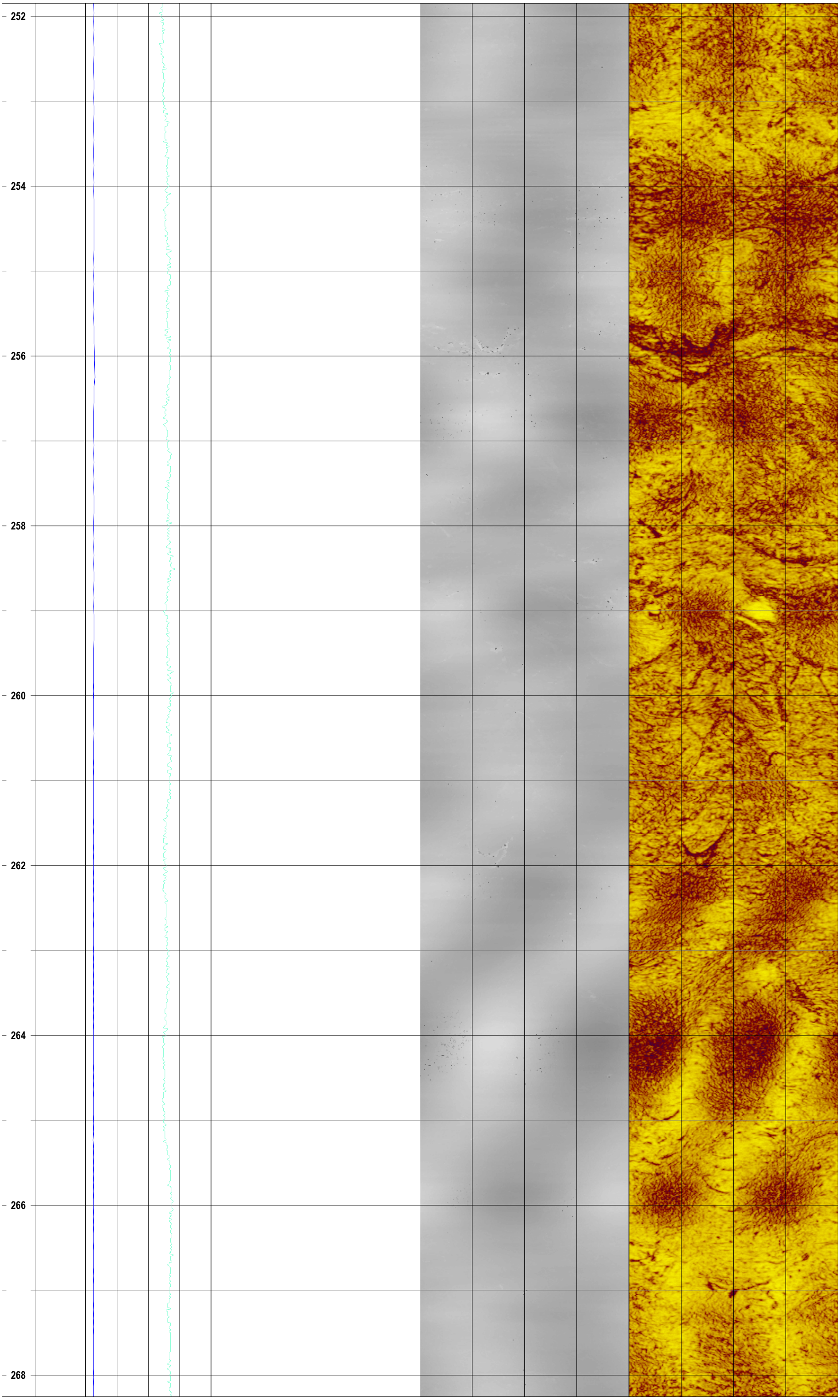
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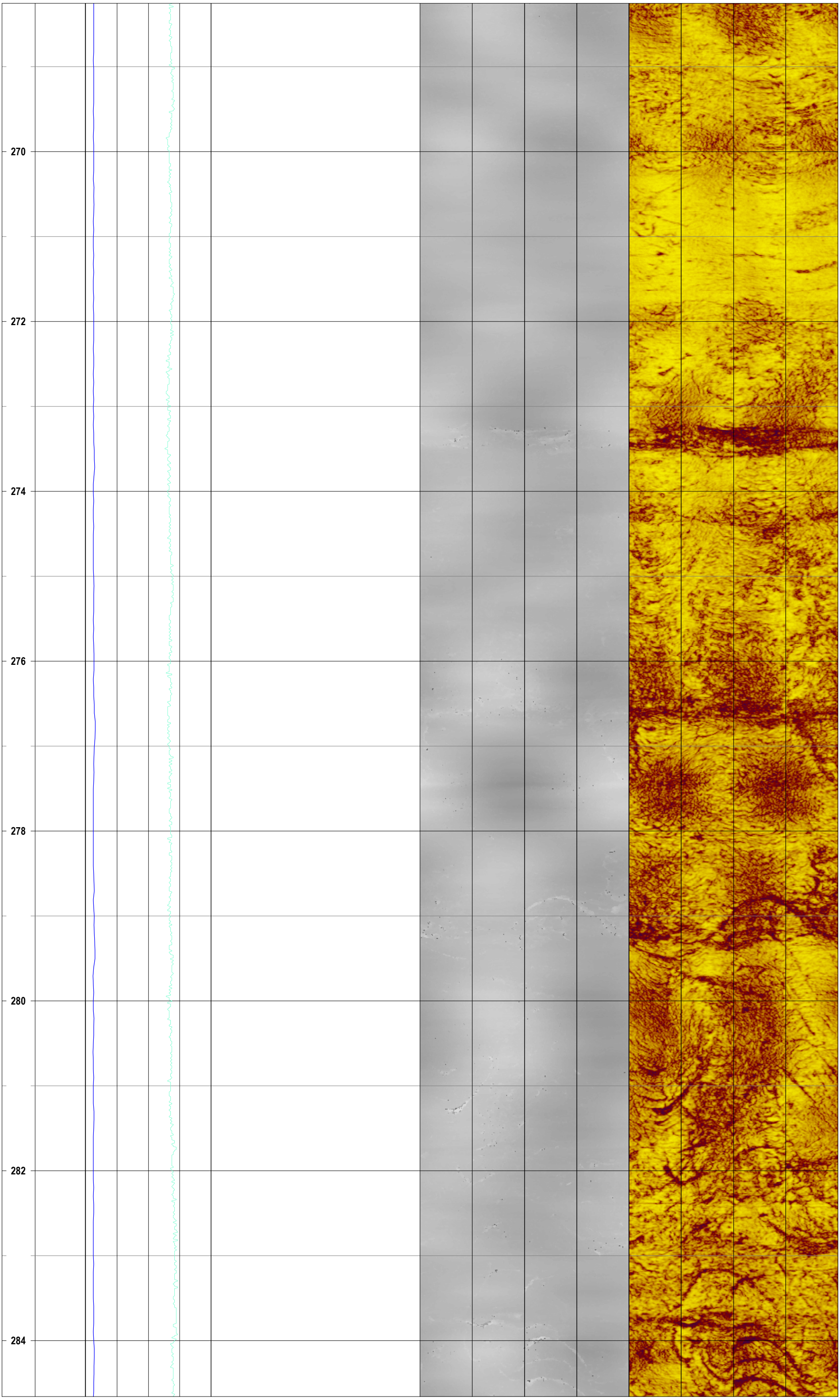
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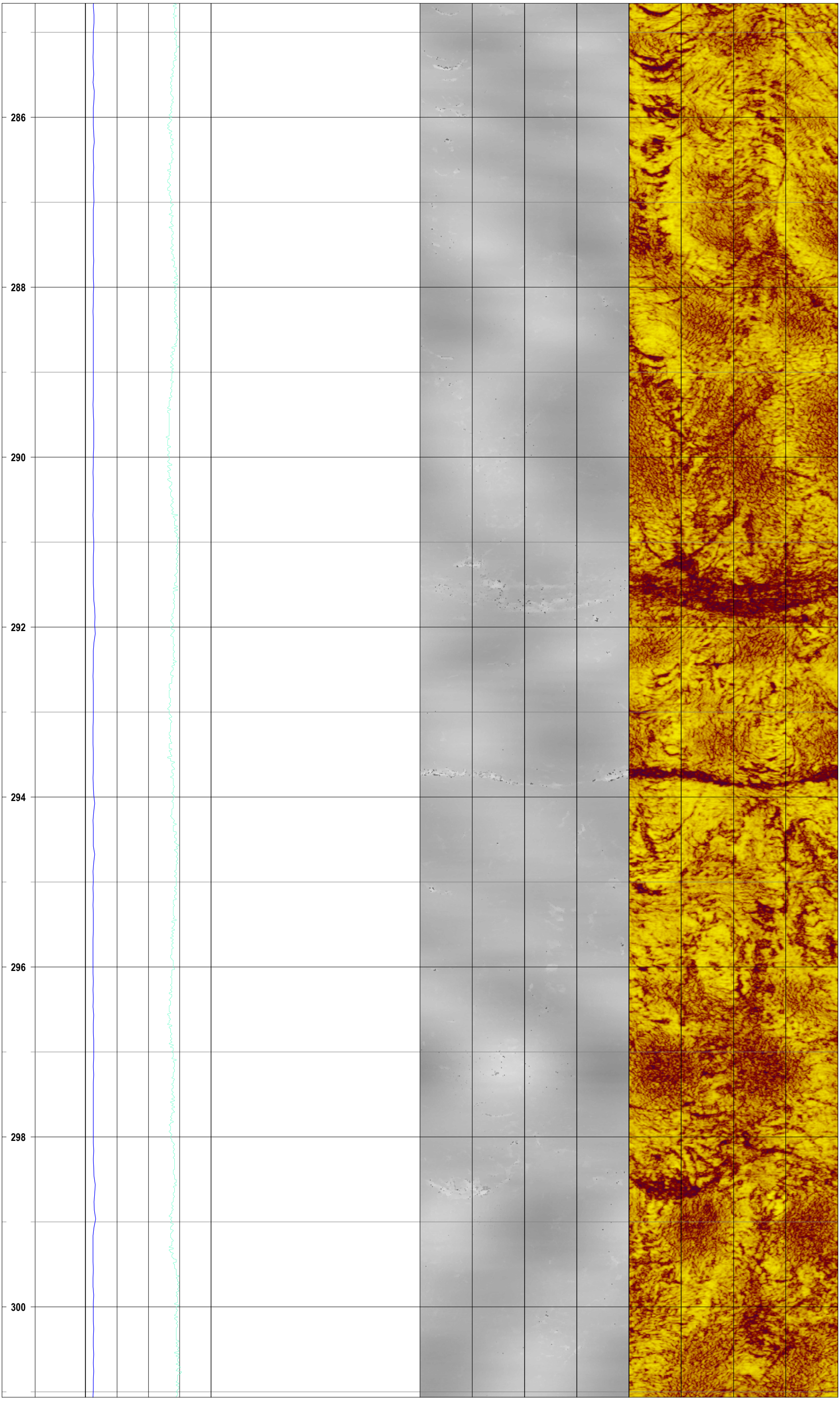
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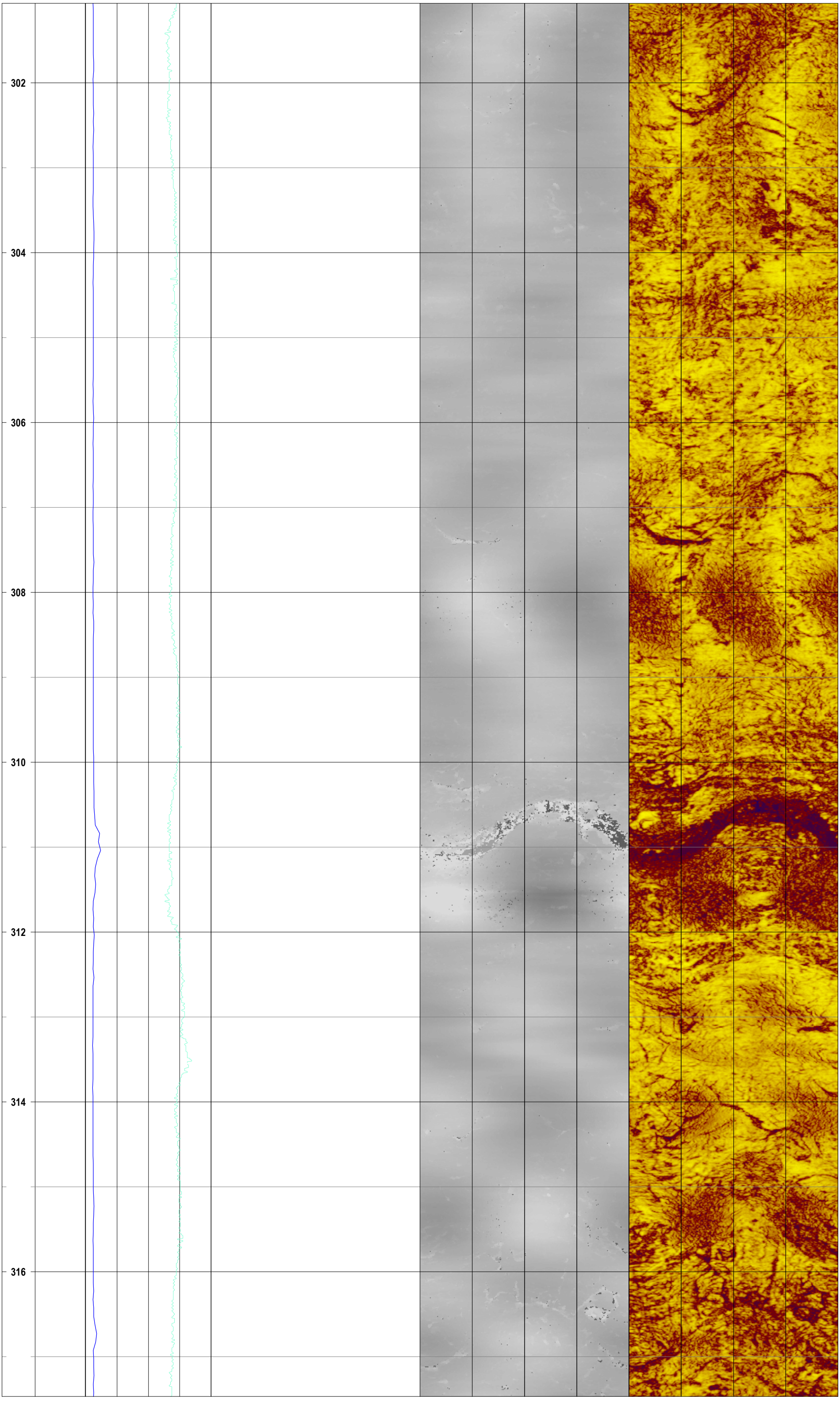
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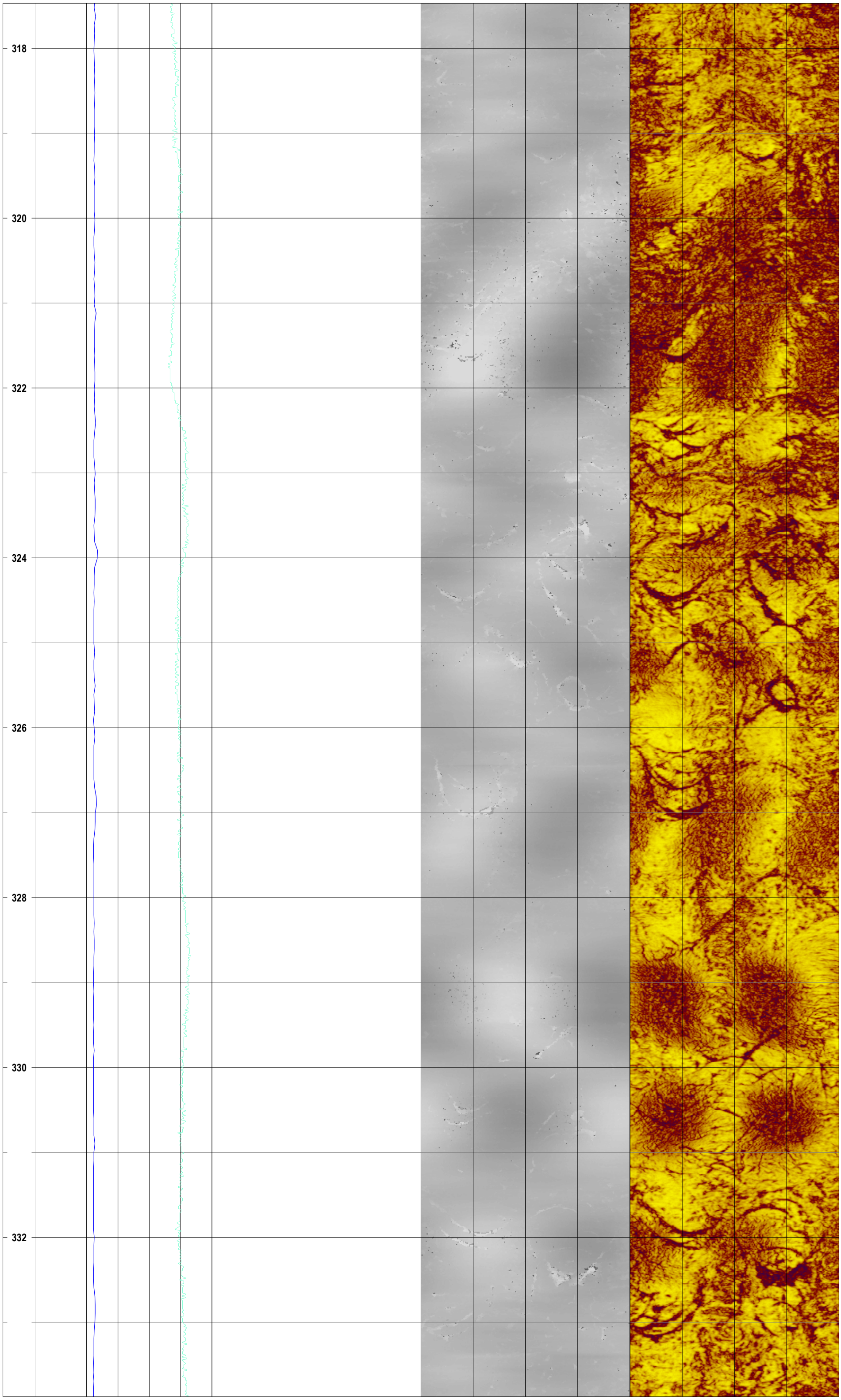
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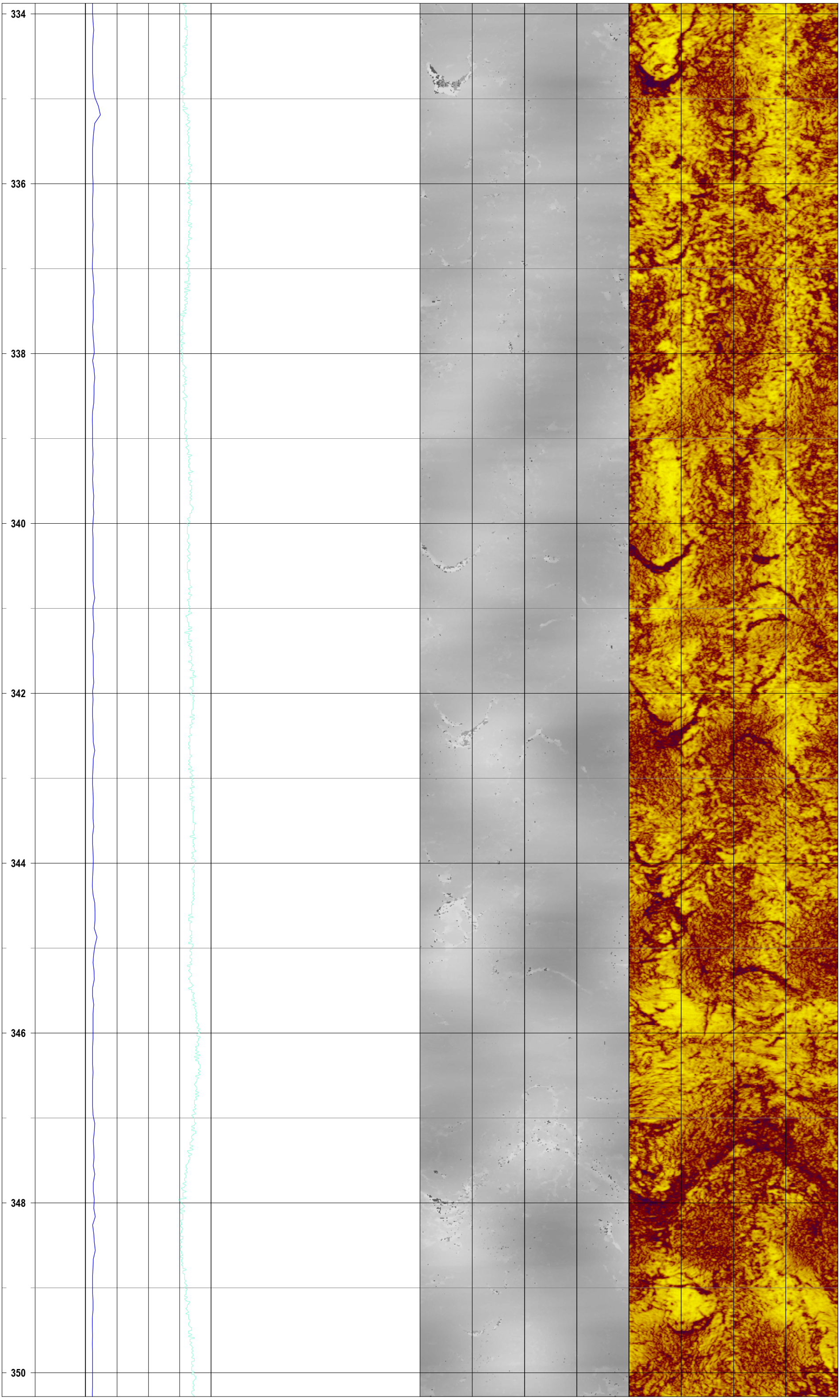
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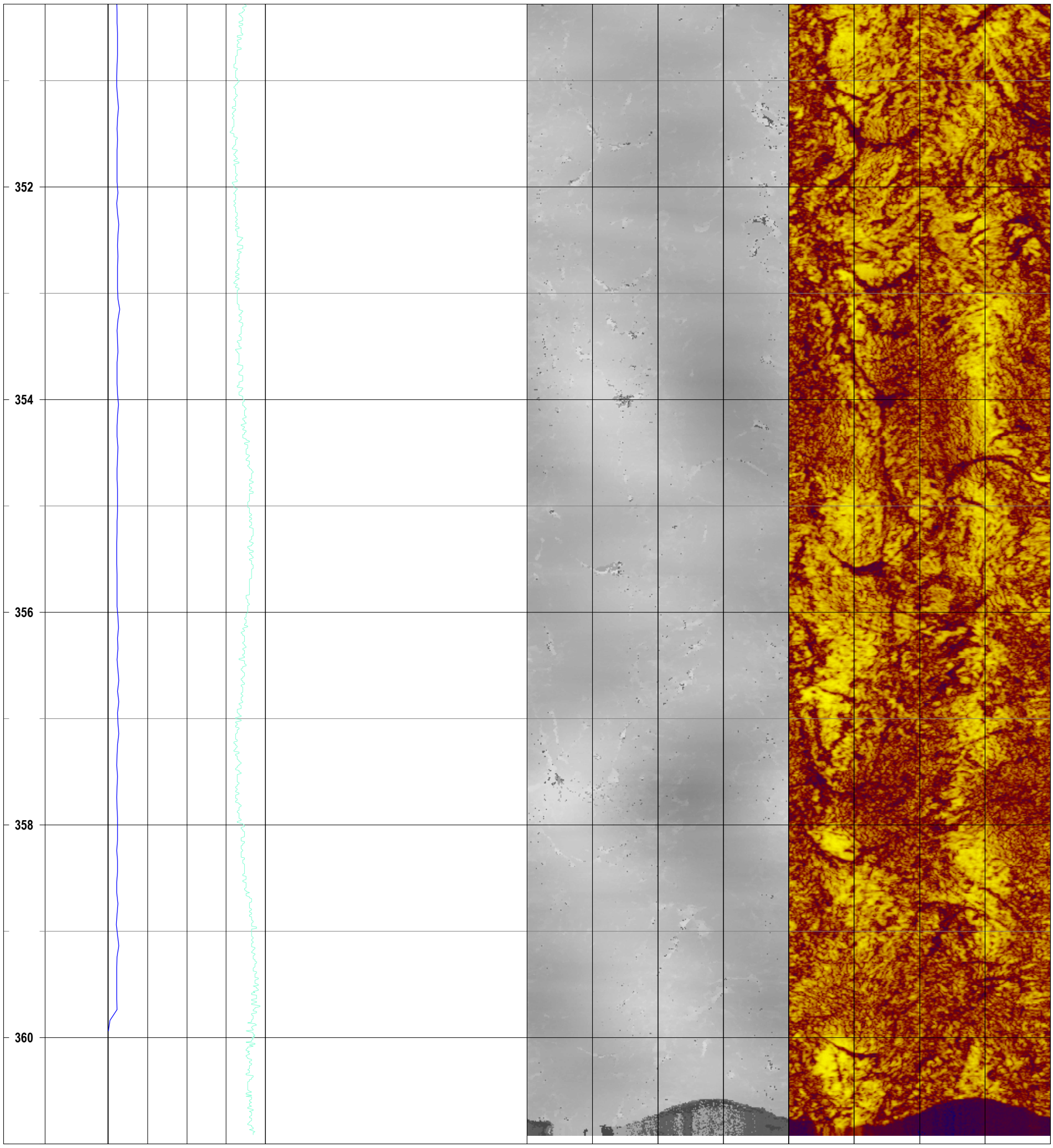
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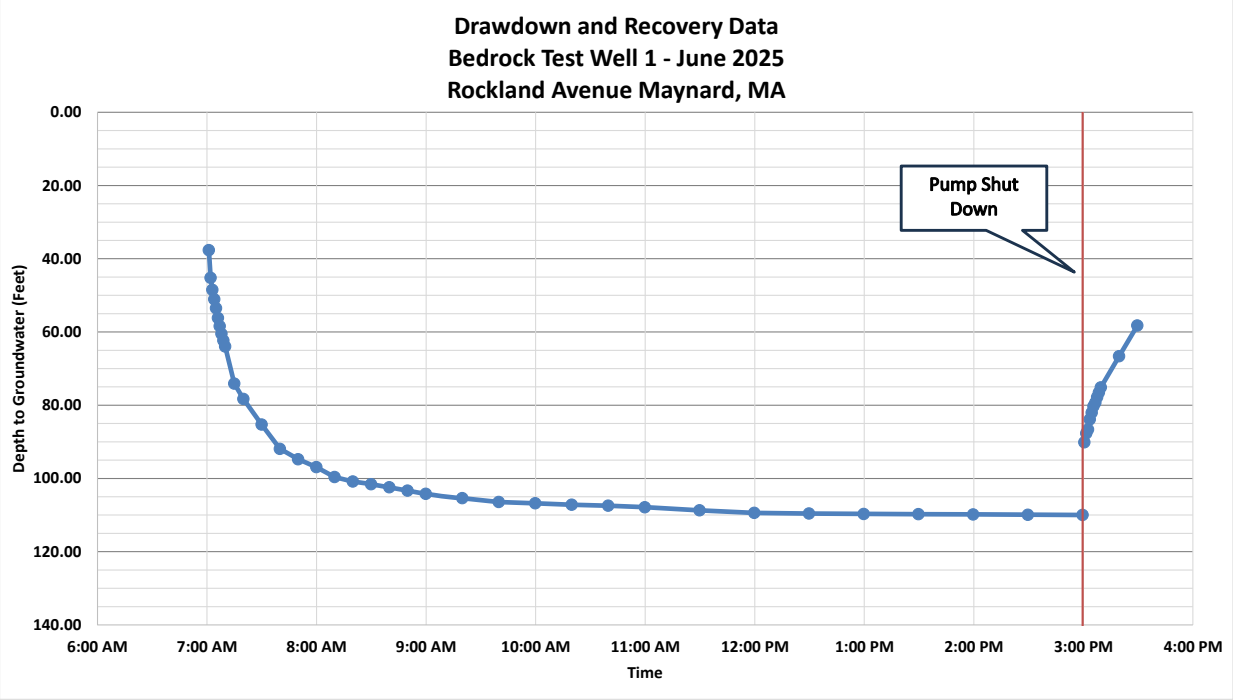
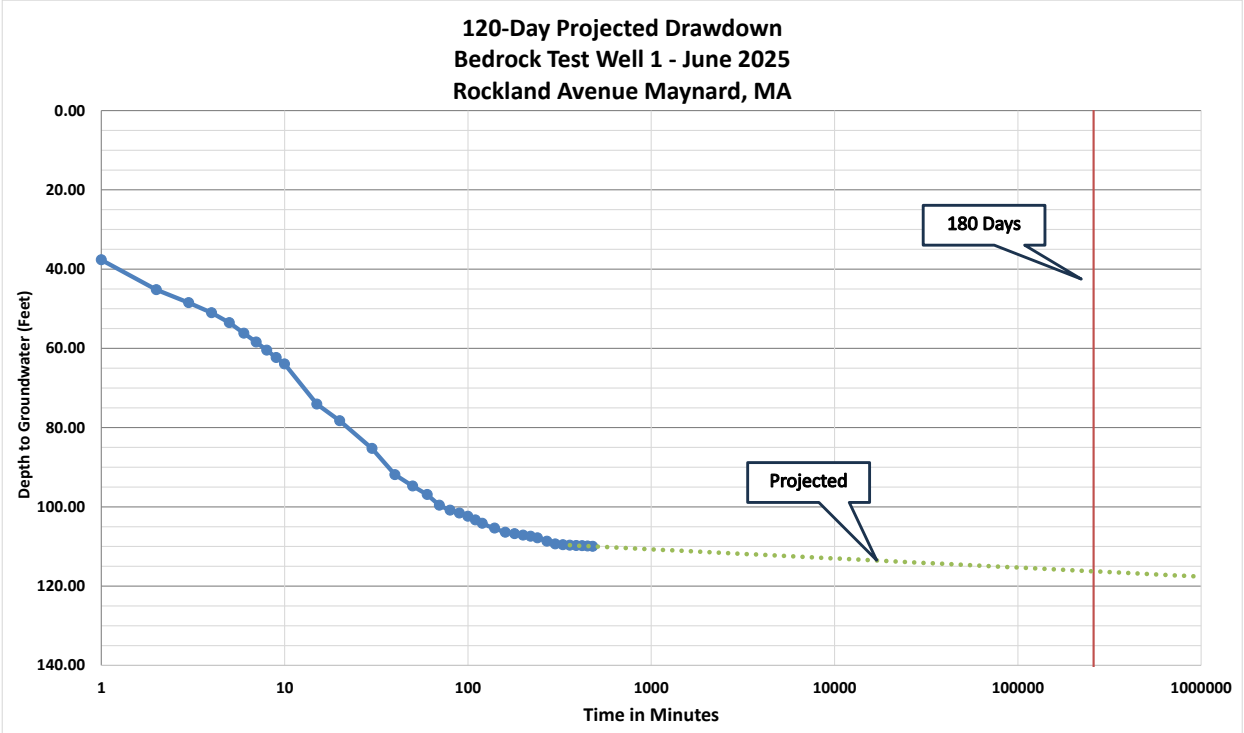
ATTACHMENT C

PUMPING TEST DRAWDOWN CHARTS AND GAUGING DATA


Drawdown and Recovery Data
Bedrock Test Well 1 - June 2025
Rockland Avenue Maynard, MA
Pump Shut Down
Depth to Groundwater (Feet)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
Time


120-Day Projected Drawdown
Bedrock Test Well 1 - June 2025
Rockland Avenue Maynard, MA
180 Days
Projected
Depth to Groundwater (Feet)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
1
10
100
1000
10000
100000
1000000
Time in Minutes

Maher Services, Inc.
71 Concord Street, North Reading, MA 01864
Tel: 978-664-9355 Fax 978-664-9356

RECORD OF PUMP TEST

Job: Maynard RW1 Inspection Job #: **5202** Date: June 12, 2025
Well No.: RW1 Contact:
Location: Maynard, MA How Q Measured: 50 Gal

Date 12-Jun	Time (HHMM)	Elapsed Time	Pumping Rate	Well **RW1**		Time (HHMM)	Elapsed Time	Pumping Rate	Well **RW1**		Time (HHMM)	Elapsed Time	Well **RW1**	Remarks
Static	700			16.46										
	701	1	100	37.65		1020	200	100	107.17		1501	1	90.14	
	702	2	100	45.20		1040	220	100	107.45		1502	2	87.68	
	703	3	100	48.48		1100	240	100	107.85		1503	3	86.65	
	704	4	100	51.05		1130	270	100	108.70		1504	4	83.89	
	705	5	100	53.52		1200	300	100	109.40		1505	5	82.06	
	706	6	100	56.19		1230	330	100	109.58		1506	6	80.30	
	707	7	100	58.42		1300	360	100	109.69		1507	7	79.28	
	708	8	100	60.48		1330	390	100	109.77		1508	8	77.79	
	709	9	100	62.33		1400	420	100	109.82		1509	9	76.55	
	710	10	100	63.96		1430	450	100	109.91		1510	10	75.12	
	715	15	100	74.10		1500	480	100	109.98		1520	20	66.62	
	720	20	100	78.30		Shut Down					1530	30	58.23	
	730	30	100	85.28										
	740	40	100	91.90										
	750	50	100	94.75										
	800	60	100	96.90										
	810	70	100	99.63										
	820	80	100	100.85										
	830	90	100	101.60										
	840	100	100	102.41										
	850	110	100	103.32										
	900	120	100	104.19										
	920	140	100	105.40										
	940	160	100	106.45										
	1000	180	100	106.80										

ATTACHMENT D

WATER QUALITY SUMMARY TABLE

TABLE 1
SUMMARY OF LABORATORY WATER QUALITY TESTING RESULTS
ROCKLAND BEDROCK TEST WELL 1 PUMPING TEST - JUNE 2025
MAYNARD MASSACHUSETTS

	Units	Standard	8-Hour 6/12/2025
Secondaries			
Turbidity	NTU	**5**	**1.10**
Aluminum	mg/L	**NS**	**0.029**
Calcium	mg/L	**NS**	**72**
Copper	mg/L	**1**	ND (0.010)
Iron	mg/L	**0.30**	**19.80**
Magnesium	mg/L	**NS**	**20.10**
Manganese	mg/L	**0.05**	**1.18**
Potassium	mg/L	**NS**	**6.2**
Silver	mg/L	**0.1**	ND (0.01)
Zinc	mg/L	**5**	ND (0.010)
Chloride	mg/L	**250**	**104.0**
Sulfate	mg/L	**250**	**172.0**
Color	CU	**15**	0
Odor	TON	**3**	**2**
Alkalinity	mg $CaCO_3$/L	**NS**	**70**
Hardness	mg $CaCO_3$/L	**NS**	**263**
TDS	mg/L	**500**	**436**
pH	SU	**6.5-8.5**	**6.68**
Inorganics			
Arsenic	mg/L	**0.010**	**0.0117**
Volatile Organic Compounds (VOCs) via EPA Method 524.2			
Methyl tert-butyl ether (MtBE)	µg/L	**70**	**0.4**
Toluene	µg/L	**1,000**	**0.6**
Other VOC Compounds	µg/L	**(note 10)**	ND (note 11)
PFAS via EPA 537.1			
PFOS	ng/L	**4 (note 12)**	**0.814**
PFOA	ng/L	**4 (note 12)**	**3.46**
PFHxS	ng/L	**(note 13)**	**1.58**
PFNA	ng/L	**(note 13)**	ND (2)
PFHpA	ng/L	**NS**	**1.55**
PFDA	ng/L	**NS**	ND (2)
Sum of 6	ng/L	**20**	**3.46**
HFPO-DA (GenX)	ng/L	**(note 13)**	ND (2)
PFBS	ng/L	**(note 13)**	**1.48**
PFHxA	ng/L	**NS**	**2.59**
Hazard Index	unitless	**1**	**0.44**

NOTES:

1. NTU = nephelometric turbidity units.
2. CU = color units.
3. TON = threshold odor number.
4. SU = standard units of hydrogen activity.
5. TDS = total dissolved solids.
6. mg/L = milligrams per liter.
7. µg/L = micrograms per liter.
8. ng/L = nanograms per liter.
9. NS = not specified.
10. MCLs vary for specific compounds.
11. Practical quantitation limits vary for specific compounds.
12. Proposed MCL.
13. Proposed "Hazard Index" MCL.
14. ND (x) = constituent not detected above laboratory PQL noted in parenthesis.
15. Laboratory detections in bold.
16. MCL exceedednces shaded in gray.

ATTACHMENT E

WATER QUALITY REPORT

NASHOBA ANALYTICAL
A DIVISION OF GRANITE STATE ANALYTICAL SERVICES, LLC

31A Willow Road Ayer, Massachusetts 01432
Phone: 978-391-4428 | website: www.nashobaanalytical.com

Laboratory Report

Maher Services
71 Concord Street
North Reading, MA 01854

Date Printed:	**06/19/2025**
Work Order #:	**2506-03252**
Client Job #:	
Date Received:	**06/12/2025**
Sample collected in:	**Massachusetts**

Attached please find results for the analysis of the samples received on the date referenced above.

Unless otherwise noted in the attached report, the analyses performed met the requirements of the analyzing laboratory's Quality Assurance Plan, Standard Operating Procedures and State Accreditation. This certificate shall not be reproduced, except in full, without the written approval of the analyzing laboratory. The results presented in this report relate to the samples listed on the following pages in the condition in which they were received. Accreditation for each analyte is identified by the * symbol following the analyte name. Location of our analyzing laboratory is identified by the code in the Analyst Column.

A & L Laboratory:
Identified by ME in Analyst Column
155 Center Street, Auburn, Maine 04210
www.allaboratory.com

Granite State Analytical Services LLC:
Identified by NH in Analyst Column
22 Manchester Road, Derry, NH 03038
www.granitestateanalytical.com

Nashoba Analytical:
Identified by MA in the Analyst Column
31A Willow Road, Ayer, MA 01432
www.nashobaanalytical.com

ANALYSIS RELATED NOTES:

- RL: "Reporting limit" means the lowest level of an analyte that can be accurately recovered from the matrix of interest.
- DF: "Dilution factor" means the ratio of the volume of the sample to the volume of the final (dilute) solution.
- MDL: "Minimum Detection Limit" means the minimum result which can be reliably discriminated from a blank with a predetermined confidence level.
- ND: Non-detect. Results reported as Non-Detect (ND) have been evaluated down to the concentration listed in the MDL column.
- A & L Laboratory / Granite State Analytical Services LLC / Nashoba Analytical. accreditation lists can be found on our websites listed above.
- Subcontracted samples will be identified by the Accreditation number of the subcontract laboratory in the analyst field for each analyte and the appropriate laboratory will be listed here. None
- Data Qualifiers (DQ) Flags provide additional information in regards to the receipt, analysis or quality control of a sample. These are indicated under the DQ Flags Column on your report and listed here if necessary: Data Qualifier (DQ) Flags: H = Hold time non-compliant., J = Estimated concentration., L = Laboratory control sample outside control limits., Q = Quality control result exceeds acceptance criteria

SAMPLE STATE SPECIFIC NOTES:

Additional Narrative or Comments: Modified 524.2 – No trip blank received.

We appreciate the opportunity to provide you with laboratory services. If you have any questions regarding the enclosed report, please contact the laboratory and we will be happy to assist you.

Erin Shaw
Laboratory Director

NASHOBA ANALYTICAL
A DIVISION OF GRANITE STATE ANALYTICAL SERVICES, LLC
31A Willow Road Ayer, Massachusetts 01432
Phone: 978-391-4428 | website: www.nashobaanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854

SAMPLE ID #: 2506-03252-001
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▽
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: M-Mass Secondary
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Turbidity*	1.1	NTU			0.5	No Limit	EPA 180.1	AH-MA	06/12/2025 03:11PM
Aluminum*	0.029	mg/L	✓	Q	0.01	0.2 mg/L	EPA 200.7	KW-MA	06/18/2025 06:19PM
Calcium*	72	mg/L			1	No Limit	EPA 200.7	PF-MA	06/16/2025 03:37PM
Copper*	<0.010	mg/L	✓		0.010	1.3 mg/L	EPA 200.7	PF-MA	06/16/2025 03:37PM
Iron*	19.8	mg/L	▽	L	0.010	0.3 mg/L	EPA 200.7	KW-MA	06/17/2025 06:36PM
Magnesium	20.1	mg/L			1.0	No Limit	EPA 200.7	PF-MA	06/16/2025 03:37PM
Manganese*	1.18	mg/L	▽		0.010	0.05 mg/L	EPA 200.7	PF-MA	06/16/2025 03:37PM
Potassium	6.2	mg/L		L	1.0	No Limit	EPA 200.7	PF-MA	06/16/2025 03:37PM
Silver*	<0.01	mg/L	✓		0.01	0.1 mg/L	EPA 200.7	PF-MA	06/16/2025 03:37PM
Zinc*	<0.010	mg/L	✓		0.010	5 mg/L	EPA 200.7	PF-MA	06/16/2025 03:37PM
Arsenic*	0.0117	mg/L	⊗		0.001	0.010 mg/L	EPA 200.8	NM-NH	06/13/2025 11:13PM
Chloride*	104	mg/L	✓		2	250 mg/L	EPA 300.0	AH-MA	06/13/2025 09:01PM
Sulfate*	172	mg/L	✓		2	250 mg/L	EPA 300.0	AH-MA	06/13/2025 09:01PM
Color, Apparent	0	CU	✓		0	15	SM 2120B	AH-MA	06/12/2025 03:10PM
Odor	2	TON	✓		0	3 T.O.N.	SM 2150B	AH-MA	06/12/2025 03:05PM
Total Alkalinity*	70	mg CaCO3/L			5	No Limit	SM 2320B	AH-MA	06/12/2025 05:10PM
Hardness (calc.)	263	mg CaCO3/L			1	No Limit	SM 2340 B	PF-MA	06/16/2025 03:37PM
Total Dissolved Solids*	436	mg/L	✓		10	500 mg/L	SM 2540C	AH-MA	06/13/2025 04:21PM
pH at 25°C*	6.68	SU	✓	H	N/A	6.5 - 8.5 SU	SM 4500-H-B	AH-MA	06/12/2025 03:15PM

Erin Shaw
Erin Shaw
Laboratory Director

NASHOBA ANALYTICAL
A DIVISION OF GRANITE STATE ANALYTICAL SERVICES, LLC
31A Willow Road Ayer, Massachusetts 01432
Phone: 978-391-4428 | website: www.nashobaanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854

SAMPLE ID #: 2506-03252-002
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: M-VOC524.2-MA
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
1,1,1,2-Tetrachloroethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,1,1-Trichloroethane*	<0.5	ug/L	✓		0.5	200 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,1,2,2-Tetrachloroethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,1,2-Trichloroethane*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,1-Dichloroethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,1-Dichloroethylene*	<0.5	ug/L	✓		0.5	7 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,1-Dichloropropylene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2,3-Trichlorobenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2,3-Trichloropropane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2,4-Trichlorobenzene*	<0.5	ug/L	✓		0.5	70 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2,4-Trimethylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2-Dibromo-3-chloropropane	<0.5	ug/L			0.5	0.2 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2-Dibromoethane	<0.5	ug/L			0.5	0.05 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2-Dichlorobenzene*	<0.5	ug/L	✓		0.5	600 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2-Dichloroethane*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2-Dichloropropane*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,3,5-Trimethylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,3-Dichlorobenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,3-Dichloropropane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,4-Dichlorobenzene*	<0.5	ug/L	✓		0.5	5.0 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
2,2-Dichloropropane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
2-Butanone (MEK)	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
2-Chlorotoluene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
2-Hexanone	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM

Erin Shaw
Erin Shaw
Laboratory Director

NASHOBA ANALYTICAL
A DIVISION OF GRANITE STATE ANALYTICAL SERVICES, LLC
31A Willow Road Ayer, Massachusetts 01432
Phone: 978-391-4428 | website: www.nashobaanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854

SAMPLE ID #: 2506-03252-002
SAMPLED BY: Steven Dubois

SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA

MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: M-VOC524.2-MA
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
4-Chlorotoluene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
4-Isopropyltoluene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
4-Methyl-2-pentanone (MIBK)	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Acetone	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Benzene*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Bromobenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Bromochloromethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Bromodichloromethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Bromoform*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Bromomethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Carbon disulfide	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Carbon tetrachloride*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Chlorobenzene*	<0.5	ug/L	✓		0.5	100 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Chloroethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Chloroform*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Chloromethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
cis-1,2-Dichloroethylene*	<0.5	ug/L	✓		0.5	70 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
cis-1,3-Dichloropropylene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Dibromochloromethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Dibromomethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Dichlorodifluoromethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Diethyl ether	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Diisopropyl ether (DIPE)	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Ethyl tert-butyl ether (ETBE)	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM

Erin Shaw
Erin Shaw
Laboratory Director

NASHOBA ANALYTICAL
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31A Willow Road Ayer, Massachusetts 01432
Phone: 978-391-4428 | website: www.nashobaanalytical.com

CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854
SAMPLE ID #: 2506-03252-002
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: M-VOC524.2-MA
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Ethylbenzene*	<0.5	ug/L	✓		0.5	700 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Hexachlorobutadiene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Isopropylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
m&p-Xylenes	<1	ug/L			1	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Methyl tert-butyl ether (MtBE)*	0.4	ug/L	✓	J	0.5	70 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Methylene chloride*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Naphthalene*	<0.5	ug/L	✓		0.5	100 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
n-Butylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Nitrobenzene	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
n-Propylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
o-Xylene	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
sec-Butylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Styrene*	<0.5	ug/L	✓		0.5	100 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
tert-Amyl methyl ether (TAME)	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
tert-Butyl alcohol (TBA)	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
tert-Butylbenzene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Tetrachloroethylene*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Tetrahydrofuran (THF)	<10	ug/L			10	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Toluene*	0.6	ug/L	✓		0.5	1000 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Total THMs*	<0.5	ug/L	✓		0.5	80 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
Total Xylenes*	<0.5	ug/L	✓		0.5	10000 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
trans-1,2-Dichloroethylene*	<0.5	ug/L	✓		0.5	100 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
trans-1,3-Dichloropropylene*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Trichloroethylene*	<0.5	ug/L	✓		0.5	5 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM

Erin Shaw
Laboratory Director

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CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854
SAMPLE ID #: 2506-03252-002
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▽
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: M-VOC524.2-MA
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Trichlorofluoromethane*	<0.5	ug/L			0.5	No Limit	EPA 524.2	JG-NH	06/17/2025 09:35AM
Vinyl chloride*	<0.5	ug/L	✓		0.5	2 ug/L	EPA 524.2	JG-NH	06/17/2025 09:35AM
1,2-Dichlorobenzene-d4	99	%	✓		0.5	70-130%	EPA 524.2 - SS	JG-NH	06/17/2025 09:35AM
4-Bromofluorobenzene	91	%	✓		0.5	70-130%	EPA 524.2 - SS	JG-NH	06/17/2025 09:35AM

Erin Shaw
Erin Shaw
Laboratory Director

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CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854

SAMPLE ID #: 2506-03252-003
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: PFAS-537.1-18-MA
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
4,8-dioxa-3H-perfluorononanoic acid (ADONA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Date Extracted	-					No Limit	EPA 537.1	SH-NH	06/13/2025 08:56AM
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorobutanesulfonic Acid (PFBS)*	1.48	ng/L		J	2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorodecanoic Acid (PFDA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorododecanoic Acid (PFDoA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluoroheptanoic Acid (PFHpA)*	1.55	ng/L		J	2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorohexanesulfonic Acid (PFHxS)*	1.58	ng/L		J	2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM

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Laboratory Director

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DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854

SAMPLE ID #: 2506-03252-003
SAMPLED BY: Steven Dubois

SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA

MORE LOC INFO: Well Head

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: PFAS-537.1-18-MA
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Perfluorohexanoic Acid (PFHxA)*	2.59	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorononanoic Acid (PFNA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorooctanesulfonic Acid (PFOS)*	0.814	ng/L	✓	J	2.00	70 ng/L	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorooctanoic Acid (PFOA)*	3.46	ng/L	✓		2.00	70 ng/L	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorotetradecanoic Acid (PFTA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluorotridecanoic Acid (PFTrDA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Perfluoroundecanoic Acid (PFUnA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:09PM
Total 6 (PFOS PFOA PFNA PFHxS PFHpA PFDA)*	3.46	ng/L	✓		2.00	20 ng/L	EPA 537.1 - Calculation	DL-NH	06/13/2025 10:09PM
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	77	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:09PM
Perfluoro-n-[1,2-13C2]decanoic Acid (13C2-PFDA)	92	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:09PM
Perfluoro-n-[1,2-13C2]hexanoic Acid (13C2-PFHxA)	97	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:09PM
Tetrafluoro-2-heptafluoropropoxy-[13C3]-propanoic Acid (13C3-HFPO-DA)	87	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:09PM

Erin Shaw
Erin Shaw
Laboratory Director

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CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854

SAMPLE ID #: 2506-03252-004
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head Field Blank

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: PFAS-537.1-18-MA-Field Blank
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
4,8-dioxa-3H-perfluorononanoic acid (ADONA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Date Extracted	-					No Limit	EPA 537.1	SH-NH	06/13/2025 08:56AM
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorobutanesulfonic Acid (PFBS)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorodecanoic Acid (PFDA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorododecanoic Acid (PFDoA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluoroheptanoic Acid (PFHpA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorohexanesulfonic Acid (PFHxS)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM

Erin Shaw
Erin Shaw
Laboratory Director

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CERTIFICATE OF ANALYSIS FOR DRINKING WATER

DATE PRINTED: 06/19/2025
CLIENT NAME: Maher Services
CLIENT ADDRESS: 71 Concord Street
North Reading, MA 01854
SAMPLE ID #: 2506-03252-004
SAMPLED BY: Steven Dubois
SAMPLE ADDRESS: Job #5202
Rockland Ave
Maynard MA
MORE LOC INFO: Well Head Field Blank

Legend	
Passes	✓
Fails EPA Primary	⊗
Fails EPA Secondary	▼
Fails State Guideline	✕
Attention	⚠

DATE AND TIME COLLECTED: 06/12/2025 01:00PM
DATE AND TIME RECEIVED: 06/12/2025 01:52PM
ANALYSIS PACKAGE: PFAS-537.1-18-MA-Field Blank
RECEIPT TEMPERATURE: 13.9° CELSIUS
CLIENT JOB #:

Test Description	Result	Test Units	Pass /Fail	DQ Flag	RL	Limit	Method	Analyst	Date - Time Analyzed
Perfluorohexanoic Acid (PFHxA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorononanoic Acid (PFNA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorooctanesulfonic Acid (PFOS)*	<2.00	ng/L	✓		2.00	70 ng/L	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorooctanoic Acid (PFOA)*	<2.00	ng/L	✓		2.00	70 ng/L	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorotetradecanoic Acid (PFTA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluorotridecanoic Acid (PFTrDA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Perfluoroundecanoic Acid (PFUnA)*	<2.00	ng/L			2.00	No Limit	EPA 537.1	DL-NH	06/13/2025 10:23PM
Total 6 (PFOS PFOA PFNA PFHxS PFHpA PFDA)*	<2.00	ng/L	✓		2.00	20 ng/L	EPA 537.1 - Calculation	DL-NH	06/13/2025 10:23PM
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	100	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:23PM
Perfluoro-n-[1,2-13C2]decanoic Acid (13C2-PFDA)	103	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:23PM
Perfluoro-n-[1,2-13C2]hexanoic Acid (13C2-PFHxA)	101	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:23PM
Tetrafluoro-2-heptafluoropropoxy-[13C3]-propanoic Acid (13C3-HFPO-DA)	94	%	✓			70-130%	EPA 537.1 - SS	DL-NH	06/13/2025 10:23PM

Erin Shaw
Erin Shaw
Laboratory Director

PO# 18325

2506-3252

NASHOBA ANALYTICAL

A DIVISION OF GRANITE STATE ANALYTICAL SERVICES, LLC

31A Willow Road Ayer, Massachusetts 01432
Phone: 978-391-4428 | website: www.nashobaanalytical.com

Lot #P2504238

Chain of Custody for Commercial Clients:

Your company name: Mayer Services

SAMPLE INFORMATION - please print clearly

Project or Customer Name:	Mayer Services, Job # 5202
Street Address:	Rockland ave, maynard, MA
Town and State:	Maynard, MA
Date Sampled:	6-12-25
Time Sampled:	1500
Sample Taken At: (i.e Kitchen Sink, Well Head…)	well Head
Sampled by (Name):	Steven Dubois 978-654-2018

Test(s) to be Performed: Secondaries, Arsenic, VOC's, PFAS

001 002 003

(if not sure ask an analyst)

Email Results:

Lab Use Only:	
Receipt Temperature:	13.9° Ice: Y or (N)
Date 6/12/25	Time 1352
Received at Lab by:	JC

Appendix C LINEAMENT ANALYSIS AT ROCKLAND AVENUE

30 Shrewsbury Streel
Holden, MA 01520

June 2, 2025

Garry F. McCarthy, P.E.
Stantec Consulting Services
45 Network Drive 3rd Floor
Burlington, MA 01803
garry.mccarthy@stantec.com

Re: Lineament Analysis at Rockland Ave
Maynard, Massachusetts
Verdantas Project #26750

Dear Mr. McCarthy:

Verdantas LLC (Verdantas) performed the following lineament analysis for the purpose of assisting the Town of Maynard Division of Public Works (the Town) with evaluating the feasibility of locating a suitable bedrock municipal water supply well. The investigation was limited to an area of interest to the north and south of Rockland Avenue (the Site) in the vicinity of existing bedrock wells and a water treatment facility (Figure 1). The investigation included a literature review of the local geology and examination of multiple aerial photographs and LiDAR data to identify lineaments. Three potential drilling targets were identified that appear favorable.

BEDROCK GEOLOGY

Statewide bedrock mapping by the U.S Geological Survey (Zen et al.) indicated bedrock at the Site consists of the Boxford Member of the Nashoba Formation. The Nashoba Formation is described by Zen et al. as “sillimanite schist and gneiss, partly sulfidic, amphibolite, biotite gneiss, calc-silicate gneiss and marble” and the Boxford Member is described as “thin-bedded to massive amphibolite, minor biotite glass”, indicating the Boxford Member is significantly more rich in amphibolite than the rest of the Nashoba Formation. However, a field analysis by Gregory J. Walsh presented in Open File Report 0-354 “Bedrock Geology in the Vicinity of the Rockland Avenue Well Site, Maynard, Massachusetts” (2000) argues that previous estimates of amphibolite in the Boxford Member were overestimated and mapped the bedrock at the Site as Nashoba Formation with small amphibolite portions termed Nashoba Formation Amphibolite.

The state map and Walsh show regional faulting trending northeast is present in the vicinity the Site. Walsh identifies regional faults directly north and south of the Site as the Spencer Brook fault and the Assabet River fault, respectfully. Walsh also describes two generations of schistosity (S1 and S2), of which S2 is more pronounced throughout the Nashoba Formation and in the Rockland Avenue area. The S2 foliation is described as a penetrative schistosity and parting commonly observed on rock surfaces were considered fractures by Walsh. The majority of these fractures were mapped to the south of Rockland Avenue. The fractures to the south of Rockland Avenue generally trended to the northeast with an average strike of 243°.

LINEAMENT ANALYSIS

Traditional overburden (sand and gravel) well sites for municipal water supply are becoming increasingly difficult to locate due to the naturally limited lateral extent of valley fill aquifers and proximity to land development. Typically, randomly sited bedrock wells only yield volumes of water sufficient for residential usage (less than 10 gallons per minute). However, bedrock wells which are sited to intercept significant bedrock joints, faults and fracture zones can potentially yield greater volumes suitable for community supply. This study aims to identify areas in the vicinity of Rockland Avenue with significant joints, faults, and/or fracture zones where a suitable community supply well can potentially be developed.

The crystalline bedrock underlying the soils in New England has essentially no primary, intergranular porosity. However, fracture zones in the bedrock, although often very narrow, create a secondary porosity that can store and transmit significant volumes of groundwater. Even under thick overburden soils, the bedrock surface expression of these fracture zones can often be identified utilizing aerial photographs and LiDAR images. Fracture traces can be correlated with subtle lineaments in vegetation, straight stream segments, and differential wetting patterns in fields which are interpreted as indications of underlying bedrock fracture zones. This technique was first described by Lattman and Parizek (1964) in carbonate aquifers but has since been found to also be applicable to crystalline bedrock as described in a National Groundwater Association course entitled *Fracture Trace and Lineament Analysis: Application to Groundwater Resources Characterization and Protection* instructed by Dr. Richard Parizek and Dr. David Gold at Penn State University in March 1999.

Aerial photographs of the area were obtained from the U.S. Geological Survey. The photos used were:

Project	Roll	Frame	Date	Scale (+/-)	Exposure	Photo Identification Number
HRO	n/a	n/a	04/09/2014	1”=125’	Color	3488517_19TBH970010**NW** 3488516_19TBH970010**NE** 3488520_19TBH970025**SE** 3488521_19TBH970025**SW**
GS-VAQZ	1	46	04/29/1963	1”=2,000’	B&W	AR1VAQZ0010046
GS-VESC	8	85	03/19/1981	1”=4,833’	B&W	NC1NHAP850045016
NASA/MSC 103	8	6244	09/13/1969	1”=10,000’	CIR	AR61030006244
GS-VEXG-C	1	94	03/24/1980	1”=2,166’	Color	AR1VGC0010094
NASA/MSC 128D	21	64	07/07/1970	1”=4,478’	CIR	AR6128D021000064
NASA/MSC 128D	19	5236	07/07/1970	1”=8,392’	CIR	AR6128D01905236
NAIP	n/a	n/a	07/21/2016	1”=2,000’	Color	M_4207137_NW_19_H_20160721
GS-VESC	8	85	03/19/1981	1”=2,000’	B&W	AR1VESC00080085

Notes:

1. “B&W” = Black and White
2. “CIR” = Color Infrared
3. “HRO”=High Resolution Ortho-imagery

The photographs were examined with the naked eye and observed lineaments were drawn on the photos. The lineaments were digitized and transferred to a MassGIS base plan of the Site using the locations of roads and surface water bodies as a reference (Figure 2). The locations of the lineaments were compared to property lines to eliminate those that may have been a result of stone walls, fences or other features associated with property lines. Due to the inherent radial distortion of the scale on aerial photos, the locations of the lineaments on the plan should only be considered accurate to ±25 feet. Numerous lineaments were identified on each set of photos. Note that multiple close lineaments are likely the same feature observed on different photos. Observations of the same feature on more than one photo gives confidence in its existence. It is significant that lineaments identified to the south of Rockland Avenue that generally match faulting identified by Walsh.

A shaded relief LiDAR image from MassGIS was also examined for lineaments to supplement those observed on the aerial photographs. Multiple lineaments were identified in the vicinity of Rockland Avenue, some of which correspond to the photo observed lineaments.

Field Observations

On April 29, 2025, Verdantas conducted a site visit to observe identified lineaments areas, identify potentially falsely identified features such as rock walls, and to observe general site conditions for potential site development issues. Two rock walls were observed to the south of Rockland Avenue, however, neither appeared to align with identified lineaments. One lineament appeared to align with part of a walking trail system to the south of Rockland Ave, but the lineament extends further than the walking trail and it couldn’t be determined if the trail system existed when aerial photography was taken. Multiple rock walls were identified to the north of Rockland Ave, but they did not appear to align with lineaments identified. Reference Figure 2 for potential lineaments and observed site features.

RECOMMENDED DRILLING LOCATIONS

Three drilling targets were identified based upon lineaments density and 400-foot Zone I radius availability. The drilling targets are labeled as TGP-1 through TGP-3 on Figure 2.

Target Priority #1 is to the south of Rockland Avenue near the boundary of two parcels owned by The City of Maynard. The two parcels are identified as 4 and 10 Rockland Avenue on Maynard GIS and are currently part of the Rockland Woods conservation area. Multiple intersecting lineaments were identified generally trending to the northeast and northwest. The northeast lineaments appeared to have a similar alignment as faulting identified by Walsh. The intersection of the lineaments provides the potential for highly fractured bedrock with the potential to yield sufficient groundwater for municipal purposes. Concerns for Target Area #1 include the disturbance of the conservation area that would come with test well drilling and potential future

infrastructure development associated with municipal well sites. Further, additional permitting requirements associated with development on conservation land could delay or prohibit the permitting process.

Target Priority #2 is to the north of Rockland Avenue between two wetland areas. Multiple intersecting lineaments were identified generally trending to the north and southeast although the spatial density of the lineaments appears slightly less than Target Priority #1. Concerns for Target Priority #2 are:

1) the target area is in the Town of Acton; and

2) apparent wetland areas exist near the target area to the east and west, which may result in permit conditions that limit yield potential if groundwater withdrawal is shown to impact wetland areas.

Target Priority #3 is also located to the north of Rockland Avenue in the vicinity of the water treatment facility and existing Well No. 6. The lineament identified may be the same lineament associated with existing well Rock Well No. 6. Review of an April 2000 Dufresne-Henry pumping test report titled “Source Final Report Rockland Avenue Bedrock Wellfield” indicated that Rock Well No. 6 was drilled as an observation well in January of 2000. Highly fractured bedrock was encountered at 360 feet, which prevented further drilling, and yield was estimated at 100+ GPM. Boring logs for wells 1 through 6 are provided as Attachment A. Unfortunately, a sufficient 400-foot Zone I radius cannot be achieved at Rock Well No. 6 due to its proximity to Rockland Avenue. To accommodate the required 400-foot Zone I radius, Target Priority 3 is proposed to the north of Rock Well No. 6 along the same apparent lineament. Concerns for this location include wetlands to the north of the target area that could limit approvable yield if groundwater withdrawal is shown to negatively impact wetland species. Additionally, there is potential for drawdown interference between a potential future well at this location and the existing supply well 06G (Well #3) to the east.

BEDROCK WELL PERMITTING

The state new source approval process for bedrock wells is similar to that for large overburden wells with a few major differences. Generally, the process involves the same steps: a Request for Site Exam, a Pumping Test Proposal, and a Final Report are submitted to the state for approval. The significant differences are in duration of the pumping test. DEP requires that bedrock wells with a capacity greater than 100,000 gallons per day are pump tested for 10 days. The final permitted yield is limited to 75% of the volume pumped during the test. Bedrock observation wells may be required which are more expensive than overburden observation wells.

CONCLUSIONS

Generally, lineament analysis of both photos and LiDAR revealed numerous features in the study area that may indicate bedrock fractures, and three target areas were chosen based upon lineament density, 400-foot Zone I availability, and previous drilling records/ reports. It is our conclusion that development of a municipal bedrock supply well within the area of interest is technically feasible from a permitting standpoint and that it appears that potentially favorable geologic conditions exist. However, each target area has potential development impediments

including proximity to wetland areas, development of conservation land to the south of Rockland Avenue, and agreements with the Town of Acton.

Geophysical methods such as resistivity/conductivity should be considered for precise location of bedrock fractures in the field.

LIMITATIONS

This lineament analysis was performed using accepted scientific methods (referenced above); however, the lineaments identified are only interpretations of features observed in the photographs. **These lineaments may not necessarily be indications of underlying bedrock fractures.** Furthermore, even wells which intercept significant bedrock fractures do not always yield usable volumes of water. No guarantee is provided that drilling at these targets will yield adequate water quantity or quality to serve a community supply or that the MADEP will grant permits for wells installed at these targets. Issues such as proximity to known/potential sources of contamination and potential environmentally sensitive receptors must be considered in addition to potential well yield/quality when siting a community supply well.

If you have questions regarding this letter, please contact either of us at the numbers below.

Sincerely,
Verdantas LLC

Landon D. Glynn
Staff Geologist III
(978) 506-5057

David G. Harwood, PG, LG
Senior Hydrogeologist
(978) 506-5064

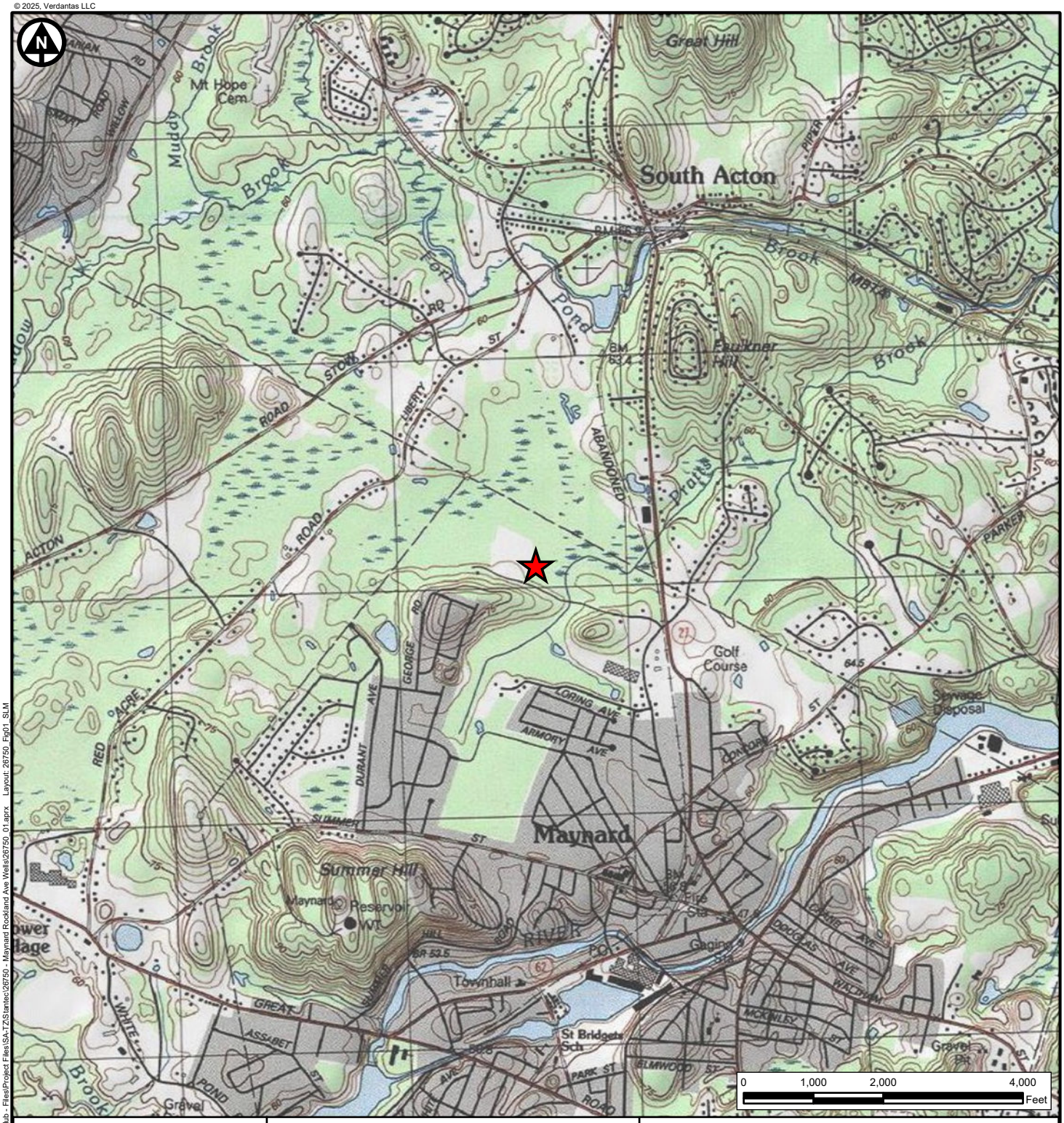
REFERENCES:

Zen, E-an, Goldsmith, Richard, Ratcliffe, N.M., Robinson, Peter, Stanley, R.S., Hatch, N.L., Shride, A.F., Weed, E.G.A., and Wones, D.R., *Bedrock Geologic Map of Massachusetts.* 1:250,000. U.S. Geological Survey, 1983.

Lattman L. H, Parizek R. R, 1964, *Relationship Between Fracture Traces and the Occurrence of Groundwater in Carbonate Rocks*. Journal of Hydrology 2:73-91

Walsh J., Gregory, 2000, *Bedrock Geology in the Vicinity of the Rockland Avenue Well Site, Maynard, Massachusetts.* U.S. Geological Survey Open File Report 01-354

FIGURES



Subject Property Location

DISCLAIMER: Verdantas LLC has furnished this map to the Client for its sole and exclusive use as a preliminary planning and screening tool. This map is reproduced from geospatial information compiled from third-party sources which may change over time and are not accurate as to mapping, surveying or engineering standards. Verdantas LLC makes no representation or warranty as to the content, accuracy, timeliness or completeness of any information. In no event will Verdantas LLC, its owners, officers, employees or agents, be liable for damages of any kind arising out of the use of this map by Client or any other party.

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Massachusetts

Sources:
Aerial Imagery: Esri Imagery Web Service dated 2024.

Topographic Map: National Geographic Society Web Service.

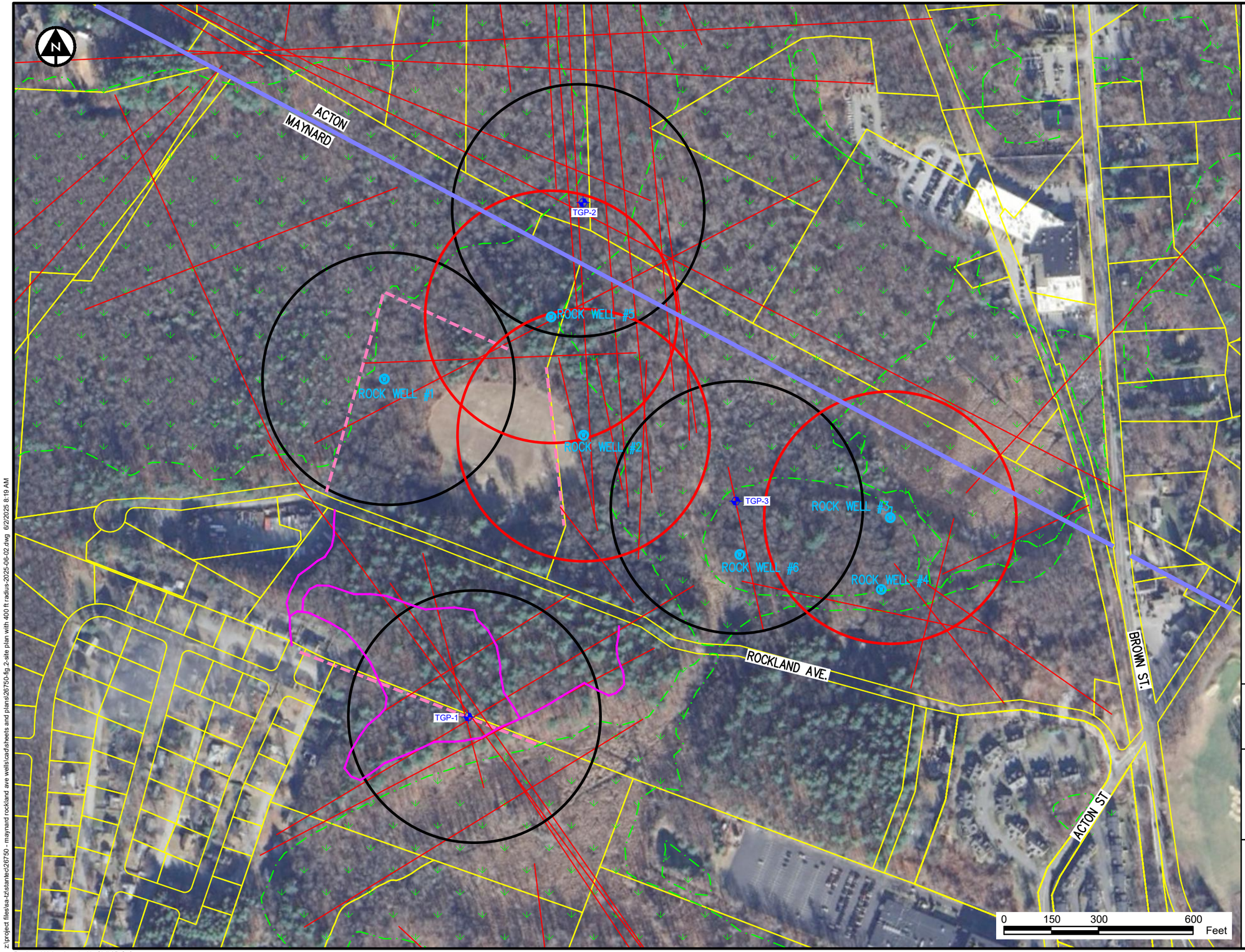
Quadrangle: Maynard, Massachusetts

Town of Maynard
Maynard, MA

Site Locus Map

Rockland Avenue Lineament Analysis

Project Number	26750
Date	05/2025
Author	bsanchez
Scale	1 in = 2,000 ft
Figure	1



LEGEND

- PROPERTY BOUNDARY
- IDENTIFIED LINEAMENT
- ROCK WALL
- POTENTIAL ZONE I (400 FOOT RADIUS)
- EXISTING ZONE I (400 FOOT RADIUS)
- WALKING TRAIL
- WETLAND AREA
- TGP-1 — TARGET PRIORITY
- ROCK WELL #1 — EXISTING WELL
- ACTON - MAYNARD TOWN LINE

NOTES:

1. WETLAND AREAS ARE BASED ON STATEWIDE COVERAGE.
2. PROPERTY BOUNDARIES BASED ON STATEWIDE GIS DATA.
3. EXISTING ROCK WELL LOCATIONS BASED ON PLAN PREPARE BY DUFRESNE-HENRY IN 2001.
4. ROCK WALL LOCATIONS BASED ON SITE VISIT OBSERVATIONS.

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Rockland Ave. Lineament Analysis Plan

Town of Maynard
Maynard, MA

Project Number	26750
Date	06/02/2025
Author	MN
Scale	1" = 300'
Figure	2

ATTACHMENT A

BORING LOGS

Well #1

to be tested for potential future service

D.L. MAHER COMPANY
P.O. BOX 127
71 Concord Street
North Reading, MA 01864
(617) 933-3210

JOB NO. 99-089-RW DRILLER Jim Ash

MACHINE NO. CP650 DATE STARTED 4/12/99

DATE COMPLETED 4/ /99

NAME Maynard MASS. D+H Gary McCarthy

MAILING ADDRESS

WELL DRILLED AT off RT 27 Maynard MA soccer Fields

DEPTH OF WELL 123' - drilled 6" reamed To 8" 42' drilling in rock

DEPTH TO LEDGE 45' soft + rotten Till 78'

FEET OF PIPE set 82' - 8" casing T+C + 8" drive shoe c/B grout rock socket

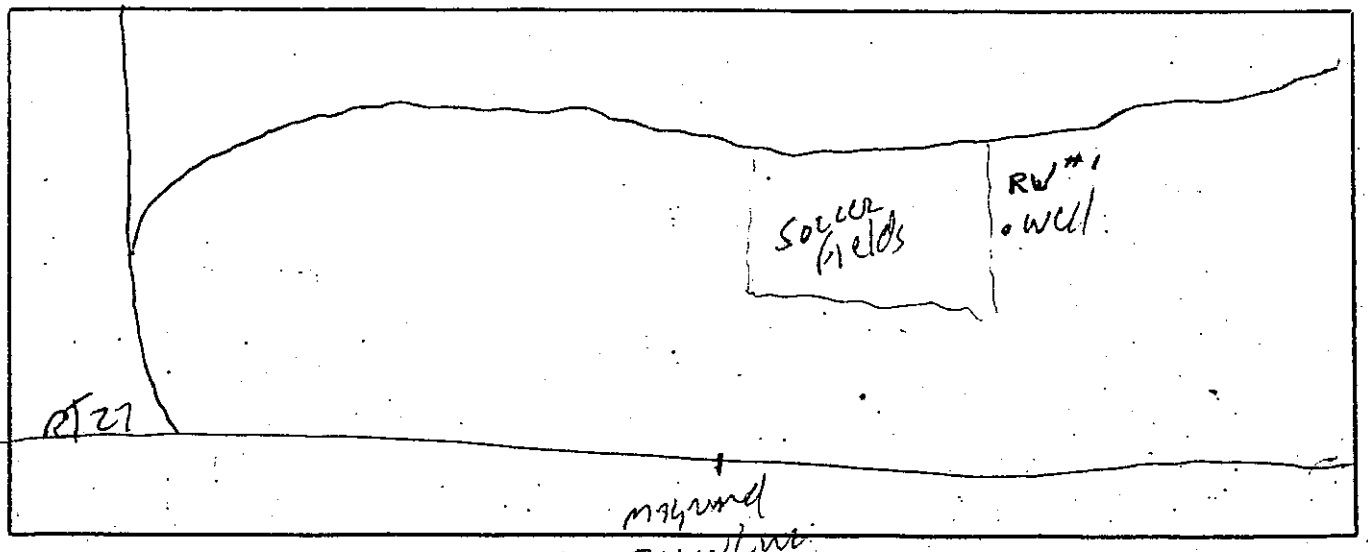
STATIC WATER LEVEL 1'

GALLONS PER MINUTE 180 gpm ±

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher Co., North Reading, MA. Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



RIG I LOCATION: Sill

CUSTOMER: Maynard NH

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Medium Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
								set 82'-8" casing	
0'-45'	6 minutes	silt 45'-78'	1950	250	soft Broken gray rock 78'-81'	7	-0-	gray rock	
81'-83'	2	—		1	soft	7	20 gpm	gray-	seam 95' dirty
83'-103'	20	8 min		250	soft	7		soft + dirty gray	Broken
103'-123'	20	→ ?						seam	115'-130'
					(seam 115-130' caving in can't set by)				

Well #11

Well #1

D.L. MAHER CO.
P.O. Box 127
71 Concord Street
North Reading, MA 01864

Job No. 99-089-RW Driller Jim Ash

Machine No. CP650 Date Started 8/17/99

Date Completed 8/18/99

Name Maynard MA

Mailing Address

Well Drilled At Well #1 Rockland Street

Depth of Well 125' set 6" casing deepen 125'-363'

Depth to Ledge 40'-~~65~~

Feet of Pipe 60'-8" casing 126'-6" casing

Static Water Level 4'

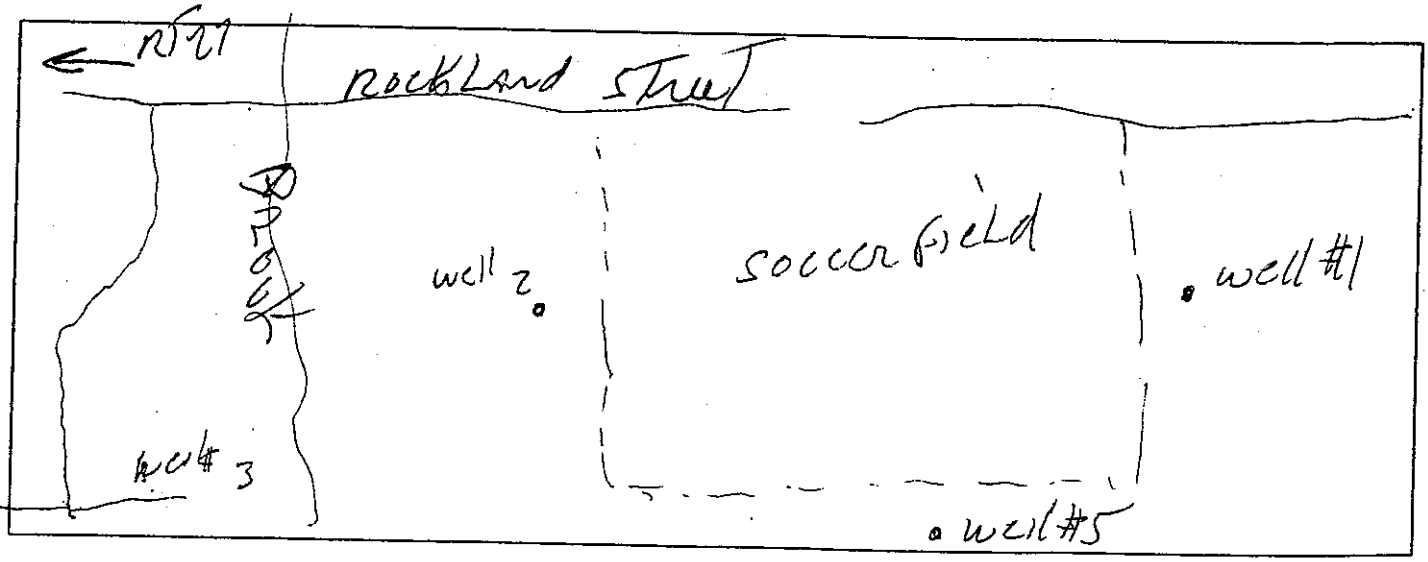
Gallons per Minute 150 (125-363) 9pm 125-150 9pm (60'-125')

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher co., North Reading, MA.

Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



Drilling Log

Customer: Maynard Location: silc #1 Date: 8/16/99

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
well 125' deep		caved in To 115'			clean out	To 125'	set 6"	Casing 125'	
					soft	4	0		
125-143	18	—	1450	240	soft		15	white	seam 138'.
143-163	20	21		1	soft	4	15	white	
163-183	20	24		250	soft md	1	50gpm	white/Black	seam 170-175
183-203	20	—		1	md-		75gpm	white-Black	185 seam
203-222	20	30		1	md	4	75	gray	
223-243	20	30		260	med	1	75-100?	gray	
243-263	20	40			med	4	1	gray	290'
263-283	20	40			med		1	gray white	
283-303	20	45			med		75-100	white	
303-323	20	50			med			gray	
323-343	20	60			med			gray	
343-363	20	62			med		100+	gray	

well #2

D.L. MAHER COMPANY
P.O. BOX 127
71 Concord Street
North Reading, MA 01864
(617) 933-3210

Well #2

In service with DEP source code 05G

JOB NO. 99-089-RW

DRILLER George Burns

MACHINE NO. BARBER III

DATE STARTED 4-28-99

DATE COMPLETED 5-6-99

NAME MAYNARD DPW

MAILING ADDRESS

WELL DRILLED AT ROCKLAND AVE (To Right of Ball Field

DEPTH OF WELL 256.6

DEPTH TO LEDGE 67.6

FEET OF PIPE 97'

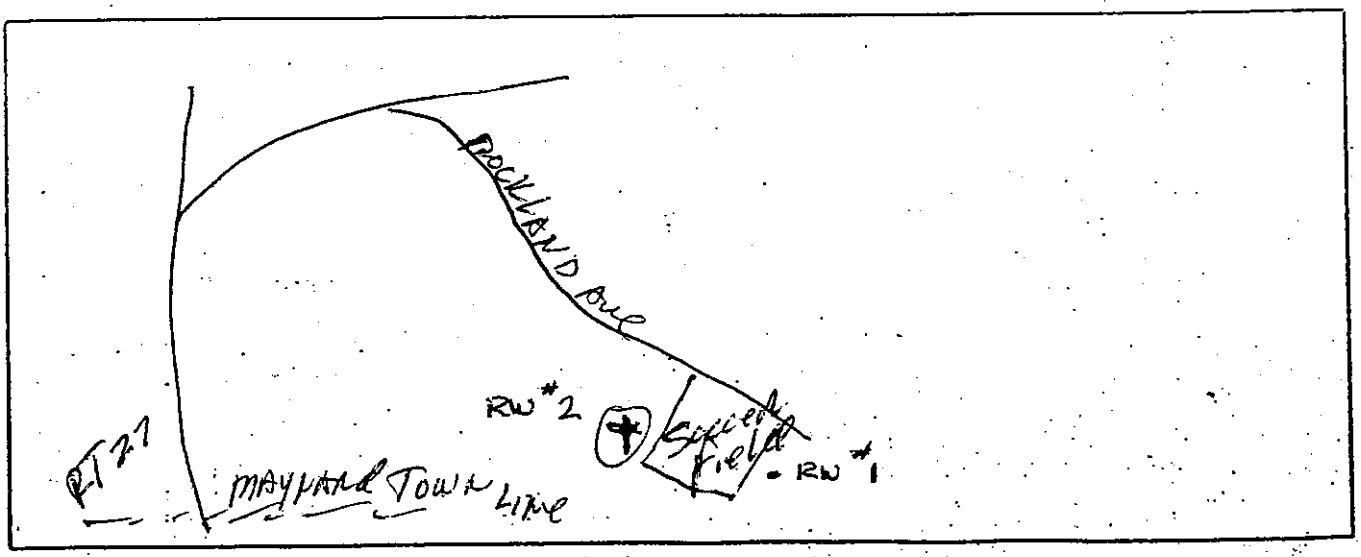
STATIC WATER LEVEL 1'

GALLONS PER MINUTE ± 150 G.P.M

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher Co., North Reading, MA. Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



USTOMER:

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Medium Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
0-163	Fine	Brown Sand	45-62	Very	Fine Gravy	Sand & Silt	, Soft	Fine. Bedrock 67-81	
163-165					Soft	5	10	gray black	
240-242					Soft	5	15	Some	
255-257					Void	~~15~~ 5	150	Some	

1527 #2

No.

Station Ball Field MAYNARD #2

Rt: 27 to Rockland AVE

D. L. MAHER CO.

RECORD OF TEST

Orifice Meter + Bucket

Time	RW2	GPM	RW1	RW3
5:00	27.78	60+		
:05	27.50			
:10	27.57			
:15	28.0			
:20	28.31			
:25	28.62	100+		
:30	46.35			
:35	47.62			
:40	47.91			
:45	48.85			
:50	49.47			
:55	49.65			
:00	50.01		6.39	3.44
1:30	50.85	150+		
2:00	67.41			
2:30	68.41	200+		
:00	74.01			
:30	74.31			
:00	74.76			
:30	75.03			
:00	75.32			
5:30	76.37			
4:00	75.59			
4:30	76.01	MAX		
5:00	79.85	MAX	9.45	5.0
5:30	80.92	MAX		
6:00	81.07			

Recovery

	RW2	RW1	RW3
6:05	10.90		
6:10	9.26		
6:15	7.93		
6:20	6.27		
6:25	5.99		
6:30			

Ted: MAX is About 270-300 9.0 m

Well #2

D.L. MAHER CO.
P.O. Box 127
71 Concord Street
North Reading, MA 01864

Job No. 99-089-RW Driller George Burns - Jim Ash

Machine No. Barber - CP650 Date Started 8/12/99

Date Completed 8/18/99

Name Town of Maynard MA

Mailing Address

Well Drilled At SITE #2

Depth of Well Barber 255' - CP650 355' 8" well straight 8"

Depth to Ledge Barber

Feet of Pipe Barber #1

Static Water Level

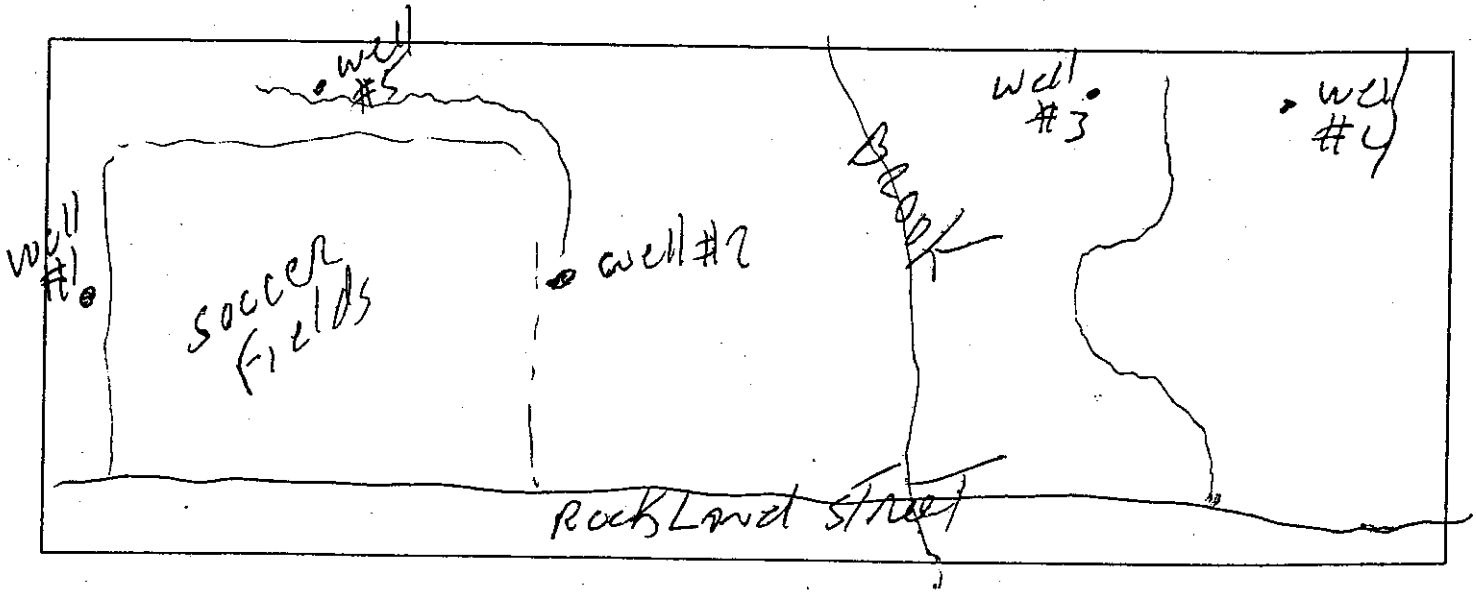
Gallons per Minute 300+

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher co., North Reading, MA.

Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



Bauer-CP65C

Drilling Log 8"

Customer: Maynard, MA Location: well #8" Date: 8/17/99

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
255-275	20	60	1950	[illegible]	Hard	6	300+		white
275-295	20	80		[illegible]	Hard				white
295-315	20	—		250	Hard-med				white - purple
315-335	20	—	1950	250	med-soft	6	300+	white to blue gray	white - gray seam 330-335
335-355	20		1950	270	med				
				some connection well #5				+ well #1	seam 330'
					Drilling #1 drew #5 down 10'				

Well #3

In service with DEP source code 06G

D.L. MAHER COMPANY
P.O. BOX 127
71 Concord Street
North Reading, MA 01864
(617) 933-3210

JOB NO. 99-089-RW

DRILLER Jim Ash

MACHINE NO. CP680

DATE STARTED 5/11/99

DATE COMPLETED 5/17/99

NAME Maynard, MA

MAILING ADDRESS

WELL DRILLED AT 8" well #3 off RT 27 Maynard, MA

DEPTH OF WELL 6" Hole 470' reamed 8" 397'

DEPTH TO LEDGE 32'

FEET OF PIPE 48' - 8" TFC casing drive shoe c/b grout
10 Bags Cement
50 lbs Bentonite
+ 8" CAP

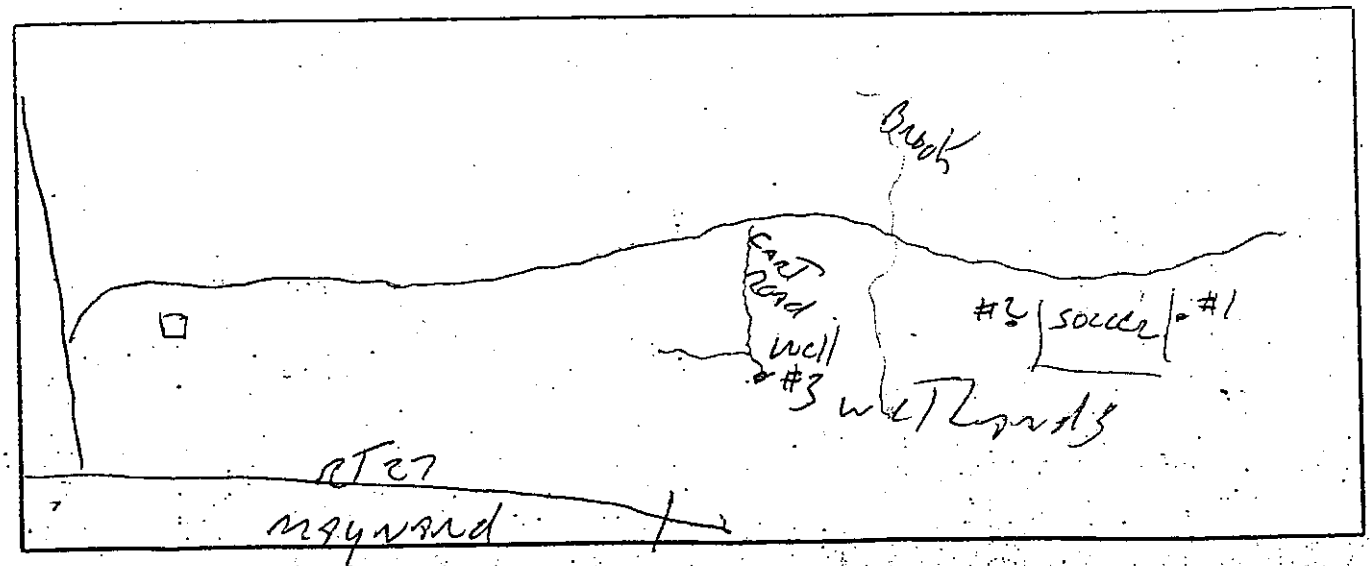
STATIC WATER LEVEL 4'

GALLONS PER MINUTE 175± gpm

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher Co., North Reading, MA. Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



CUSTOMER: Maynard

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Medium Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
	0-32 51	Tyson	32-38 soft	rock 38-	48' competent	white rock	—	48" casing	4½ grout
			1550	240	med	4	-0-	white - black	60'
48-63	15	—		246	med-soft	4	-0-	black-gray-white	
63-83	20	15		240	med-soft	4	-0-	gray-white	
83-103	20	15		240	med	4	-0-	gray-white	
103-123	20	17		240	med	4	-0-	gray-white	140' mostly black
123-143	20	18		240	med	4	-0-	mostly black	Hard gray-white
143-163	20	19		240	med	4	-0-	white→black - mostly white	
163-183	20	18		240	med-soft	4	-0-	mostly white	gray
183-203	20	15		245	soft	4	50±	mostly white	210 clay - black
203-223	20	—		245	med	4	50±	black - gray white	
223-243	20	19		250	med	4	↓	gray-white - gray black	
243-263	20	28		258	med	4	75-100	gray→white	
263-283	20	30		255	med	4	↓	gray-white	black purple
283-303	20	29		255	med	4	75-100	black purple	
303-323	20	30		255	med	4	75-100	black-purple	
323-343	20	35		260	med	4		black purple pyrite	
343-363	20	50		260	med	4	25-100	" "	370-380
363-383	20	55		260	med	4		black→purple	
383-403	20	65		260	med	4	|	" "	
403-423	20	70		260	med	4	|	black→purple	
423-443	20	74		265	med	4	|		
443-463	20	75		265	med	4	75-100	stop	470'
463-483	19	—							
483-503									

D.L. MAHER COMPANY
P.O. BOX 127
71 Concord Street
North Reading, MA 01864
(617) 933-3210

#4

not suitable to put into service

JOB NO. 99-089-W

DRILLER George Burns

MACHINE NO. BAR M

DATE STARTED 6-11-99

DATE COMPLETED 6-17-99

NAME _____

MAILING ADDRESS _____

WELL DRILLED AT _____

DEPTH OF WELL 600'

DEPTH TO LEDGE 37'

FEET OF PIPE 60'

STATIC WATER LEVEL ± 7'

GALLONS PER MINUTE ± 25

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher Co., North Reading, MA. Total amount due: $_____

Signed: _____

Location of job by street names or route number and show location of well on property.

ILLING LOG
STOMER: MAYNARD #4 - LOCATION:

Feet rilled	Total Feet Drilled	Total Drilling Time:	Eng. RPM	Drilling Pressure	Drillability Soft/Medium Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
60-115	55		1900	250	Med-Hard	5	0	Black Gray	
115-175	60		1900	250	Hard	5	3	Black	
175-195	20		1900	250	Hard	5	6	Black	
195-250	55		1900	250	Hard	5	~10	Black	
250-350	100		1900	250	HARD	5	15	Black	
350-390	40		1900	250	Hard	5	15	Light Gray	
390-600	210		1900	250	Hard	5	±25	Black	

Well #5

In service with DEP source code 07G

D.L. MAHER CO.
P.O. Box 127
71 Concord Street
North Reading, MA 01864

Job No. 99-089-RW
Machine No. CP650
Driller JIM Ash
Date Started 8/7/99
Date Completed 8/11/99

Name MAYNARD MA
Mailing Address 1-978-897-1017 WALTER
Well Drilled At site #5 Rockland Street, Maynard, MA
Depth of Well 370'-6" then reemed to 8" diam to 395'
Depth to Ledge 45' - 12¼" Hole
Feet of Pipe 80'-T+C 8" CASING+DRIVESHOE
Static Water Level
Gallons per Minute

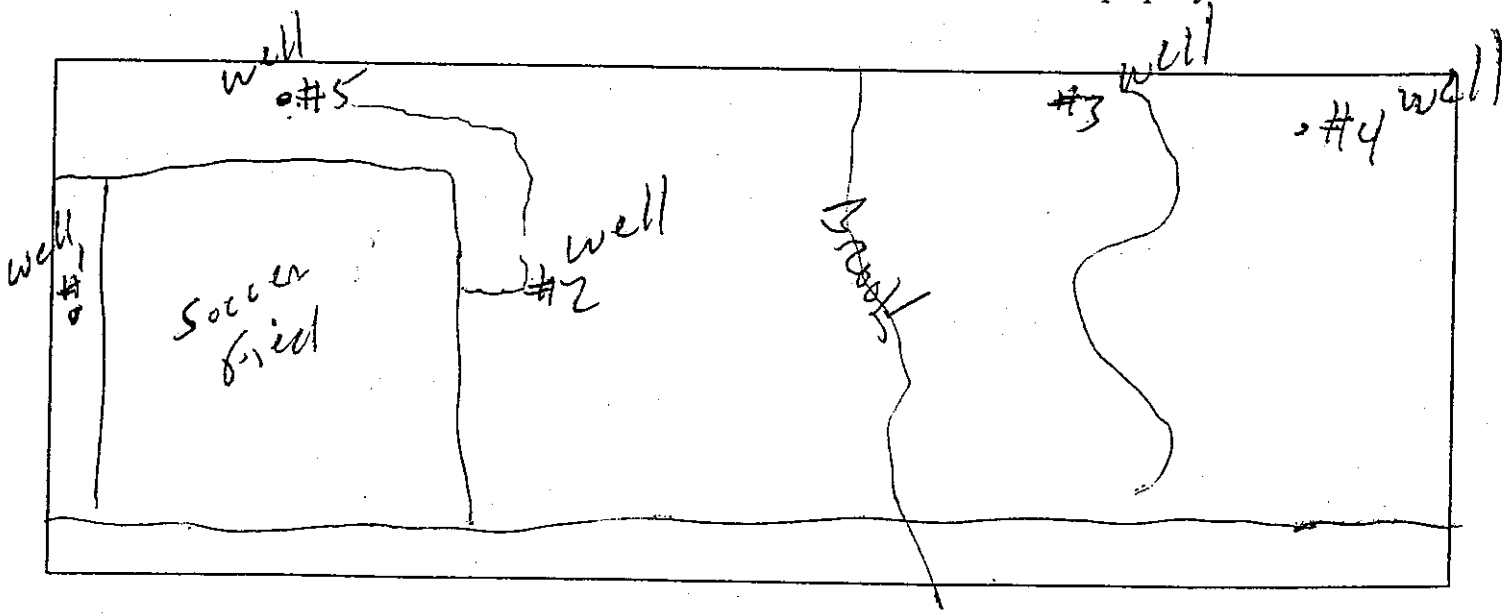
C/B grouted
12 Bags cement
60LBS Bentonite

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher co., North Reading, MA.

Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



WELL #5

Drilling Log

Customer: Maynard, NM Location: SITE #5 Date: 8/9/99

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
0-4 sil	T 4'	12' GRAVEL 12"- 45' L-layers fine			SILT + GRAVEL 48'			rotten rock	68'-80' rock
	SET 80'	- 8" CASING SHOE + C/B GROUT							
80-83	3	—	1950	240	soft-med	7	0	gray-white	
83-103	20	16		/	/		15gpm	white	83-93' BLACK SEAM
103-123	20	15						white-gray-white	
123-143	20	15		240	soft med		30gpm	gray	125, 132, 140, SEAMS
143-163	20	16		/	/			gray	
163-183	20	17						gray	
183-203	20	17		240	med		30gpm	gray-	white 190'
203-223	20	17			/		/	white-	gray
223-243	20	18						gray -	white 240
243-263	20	15		240	med		30gpm	white	
263-283	20	20			med		/	white-gray	
283-303	20	23			med			gray	GRAY+BLACK SEAM 310'±
303-323	20	29			/		75±	gray	
323-343	20	34					/	gray - white - gray	
343-363	20	42			med		100+	gray	MICRO SEAMS
363-383	20	[redacted]			/		150+	gray	2-3 POSSIBLE SEAMS 378'
[redacted]	14				[redacted]		[redacted]	[redacted]	
ANN							200-300		coolant drilling 6"
370-376	6	—			med	•	200-300		
376-396	20				med		200-300		
396-416	20								

#6

D.L. MAHER CO.
P.O. Box 127
71 Concord Street
North Reading, MA 01864

not suitable to put into service-
400-foot radius not available

Job No. 99-089-RW
Machine No. CP650
Driller TIM A.
Date Started 1/25/00
Date Completed 1/27/00

Name Maynard, MA
Mailing Address
Well Drilled At 8" OB well
Depth of Well 360' - 6" Hole
Depth to Ledge 43'
Feet of Pipe 69' - 8" T+L casing + drive shoe
Static Water Level 4' est.
Gallons per Minute 100+

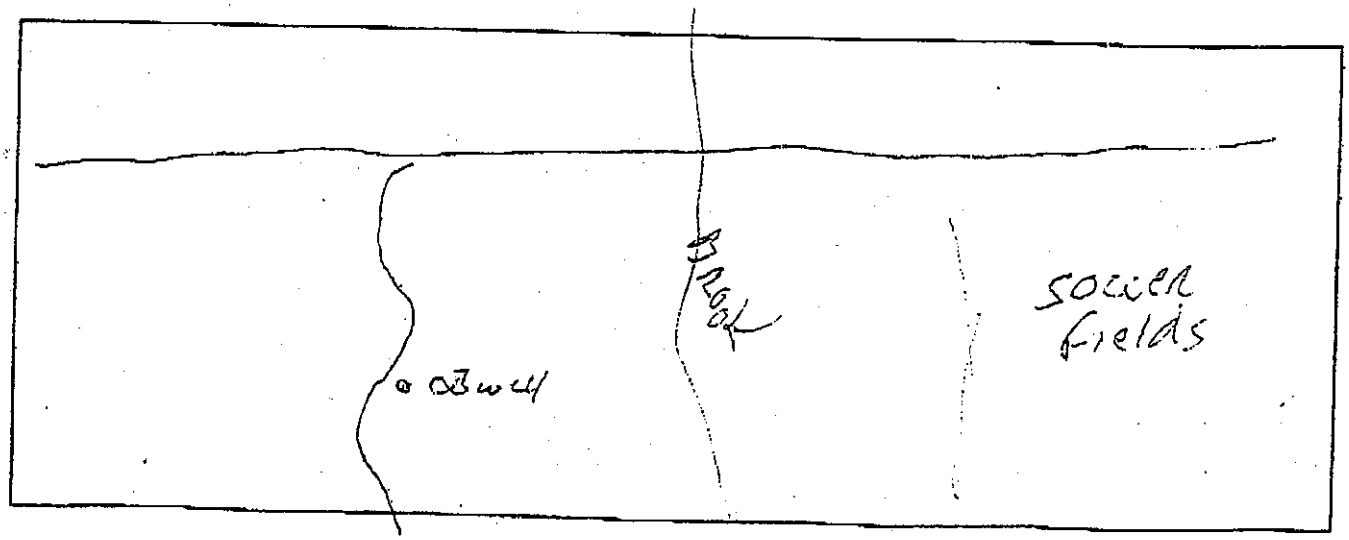
e/B grout
10 Bags cement
50 LBS Bentonite

Drilling was completed today on the above well. We hereby accept this well and agree to make payment as per contract to the D.L. Maher co., North Reading, MA.

Total amount due: $

Signed:

Location of job by street names or route number and show location of well on property.



#6

Drilling Log

Customer: Maynard, MA Location: 8" OB Date: 1/26/00

Feet Drilled	Total Feet Drilled	Total Drilling Time	Eng. RPM	Drilling Pressure	Drillability Soft/Med/ Hard	Water Injection GPM	Hole Making Water GPM	Formation	Remarks
0-43'	FINE SANDS SOME COBBLES			43'-58'	SOFT ROCK	58'-68'	BLACK HARD ROCK		
68-83	15'	—	1950	260	SOFT	5			SOFT BLACK
83-103	20	15			SOFT			BLACK	GRAY WHITE
103-123	20	16			SOFT-MED		6-8GPM	GRAY-WHITE TO BLACK	
123-143	20	15		260	MED-SOFT	5GPM		BLACK TO GRAY	
143-163	20	15			MED			GRAY	WHITE & GRAY
163-183	20	16			MED			WHITE	GRAY-WHITE
183-203	20	17		260	MED	5GPM	6-8GPM	GRAY	
203-223	20	16			MED			GRAY	
223-243	20	17			MED			GRAYISH-PURPLE	
243-263	20	18		260	MED	5GPM	15-20GPM	GRAYISH-PURPLE	320 @ 255-260'
263-283	20	18			MED			GRAYISH-PURPLE-WHITE	
283-303	20	18		260	MED			WHITE & GRAY	
303-323	20	18			MED	5GPM		GRAY	
323-343	20	19			MED			GRAY	
343-363	20	20		260	MED		100+	GRAY	343-363 3.5-100+ GPM

COULDN'T DRILL PAST

Appendix D WHITE POND SELECT PFAS DATA

2019 - 2020 PFAS Sampling Results
GZA Immediate Response Action
Status Report No. 2
08/28/2020

SEE FIGURE-3 FOR DETAILED VIEW

OVERVIEW OF SAMPLING AREAS

SURFACE-W-3 SAMPLE AREA

FULL-VIEW SITE AREA

0 1,200 2,400 SCALE IN FEET

LAKE BOON

WHITE POND

GATE TO DIRT ROAD

664 SUDBURY ROAD

SUDBURY ROAD

STATE ROAD

MAIN STREET

WHITE POND ROAD

BRUEN ROAD

TOWN OF STOW

TOWN OF HUDSON

TOWN OF SUDBURY

GZ-26

GZ-27

GZ-28

GZ-30

GZ-29

GZ-36R

GZ-36S

GZ-10D(50)

GZ-9D(50)

GZ-35R

GZ-35S

GZ-34S

GZ-34R

GZ-32

GZ-31

GZ-33

GZ-5R

GZ-25D(50)

GZ-24D(50)

GZ-23D(50)

GZ-37

GZ-38D

GZ-38S

GZ-38D(50)

10.7 ppt PFOA (9/17/2019)
26.6 ppt PFOS (8/5/2020)
35.2 ppt PFPeA (8/5/2020)

9.83 ppt PFOA (9/17/2019)
13.1 ppt PFOS (8/5/2020)
35.3 ppt PFPeA (8/5/2020)

6.07 ppt PFOA (9/19/2019)
12.5 ppt PFOS (9/19/2019)
7.82 ppt PFNA (9/19/2019)

Pump Station

assumed 200' intake line

11.4 ppt PFOA (8/5/2020)
37.0 ppt PFOS (8/5/2020)
42.2 ppt PFPeA (8/5/2020)

8.4 ppt PFOA (8/6/2020)
9.3 ppt PFOS (8/6/2020)
33.1 ppt PFPeA (8/6/2020)

Surface:
8.0 ppt PFOA (8/6/2020)
8.7 ppt PFOS (8/6/2020)
32.4 ppt PFPeA (8/6/2020)

10 feet bws:
10.1 ppt PFOA (8/6/2020)
10.9 ppt PFOS (8/6/2020)
42.6 ppt PFPeA (8/6/2020)

20 feet bws:
10.3 ppt PFOA (8/6/2020)
12.5 ppt PFOS (8/6/2020)
42.9 ppt PFPeA (8/6/2020)

8.0 ppt PFOA (8/6/2020)
10.4 ppt PFOS (8/6/2020)
31.9 ppt PFPeA (8/6/2020)

Surface:
8.2 ppt PFOA (8/6/2020)
8.7 ppt PFOS (8/6/2020)
33.0 ppt PFPeA (8/6/2020)

10 feet bws:
10.4 ppt PFOA (8/6/2020)
11.6 ppt PFOS (8/6/2020)
43.1 ppt PFPeA (8/6/2020)

20 feet bws:
8.1 ppt PFOA (8/6/2020)
8.8 ppt PFOS (8/6/2020)
31.7 ppt PFPeA (8/6/2020)

10.6 ppt PFOA (8/6/2020)
11.9 ppt PFOS (8/6/2020)
45.5 ppt PFPeA (8/6/2020)

Surface:
10.1 ppt PFOA (8/6/2020)
11.8 ppt PFOS (8/6/2020)
42.8 ppt PFPeA (8/6/2020)

10 feet bws:
10.5 ppt PFOA (8/6/2020)
12.2 ppt PFOS (8/6/2020)
44.1 ppt PFPeA (8/6/2020)

20 feet bws:
10.4 ppt PFOA (8/6/2020)
12.0 ppt PFOS (8/6/2020)
43.6 ppt PFPeA (8/6/2020)

10.8 ppt PFOA (8/6/2020)
15.2 ppt PFOS (8/6/2020)
44.4 ppt PFPeA (8/6/2020)

SAMPLE AREA DETAILED-VIEW

0 30 60 SCALE IN FEET

LEGEND

- GZ-22S — SHALLOW OVERBURDEN MONITORING WELL
- GZ-22D — INTERMEDIATE OVERBURDEN MONITORING WELL
- GZ-20 — DEEP OVERBURDEN MONITORING WELL
- GZ-21 — BEDROCK MONITORING WELL
- SOIL BORING
- SEDIMENT SAMPLE COLLECTED BY GZA PERSONNEL MARCH 2021
- SEDIMENT SAMPLE (0-1'; 2-3'; 4-5') COLLECTED BY GZA PERSONNEL FEBRUARY 2021
- SEDIMENT SAMPLE (5-5.5'; 8-8.5') COLLECTED BY GZA PERSONNEL SEPTEMBER - OCTOBER 2020
- SEDIMENT SAMPLE (0-1'; 5-5.5'; 8-8.5') COLLECTED BY GZA PERSONNEL SEPTEMBER - OCTOBER 2020
- SEDIMENT SAMPLE COLLECTED BY GZA PERSONNEL AUGUST 2020
- SEDIMENT SAMPLE
- SURFACE WATER / SEDIMENT SAMPLE COLLECTED BY GZA PERSONNEL AUGUST 2020
- MULTI-DEPTH SURFACE WATER SAMPLE COLLECTED BY GZA PERSONNEL AUGUST 2020
- DELINEATION SOIL SAMPLE COLLECTED BY GZA PERSONNEL AUGUST 2020
- POST EXCAVATION SOIL SAMPLE COLLECTED BY GZA PERSONNEL JULY-AUGUST 2020
- SURFACE WATER SAMPLE COLLECTED BY GZA PERSONNEL AUGUST 2020 OR APRIL 2021
- AQUEOUS SAMPLE COLLECTED BY CMG ENVIRONMENTAL SEPTEMBER 2019
- SURFACE WATER SAMPLE COLLECTED BY CMG ENVIRONMENTAL SEPTEMBER 2019
- SURFICIAL SOIL SAMPLE COLLECTED BY CMG ENVIRONMENTAL SEPTEMBER 2019
- SLUDGE SAMPLE COLLECTED BY CMG ENVIRONMENTAL SEPTEMBER 2019
- TOWN BOUNDARY
- ASSESSORS PARCEL DATA
- GROUNDWATER ELEVATION CONTOUR IN FEET (APRIL 7, 2021 GAUGING)

NOTES:

1) MONITORING WELLS GZ-7 & GZ-15 WERE NOT USED IN CONTOURING.
2) ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

SOURCE

1) THIS MAP CONTAINS THE 2021 AERIAL IMAGERY MAP SERVICE DISTRIBUTED BY MASSGIS ON JANUARY 26, 2022. THE PLANNING, ACQUISITION, PROCESSING, AND CREATION OF DERIVATIVE PRODUCTS BY MASSGIS AND NV5 GEOSPATIAL OF LEXINGTON, KY. THE IMAGERY WAS ACQUIRED BETWEEN MARCH 17 AND APRIL 24, 2021.
2) THE LEVEL-3 ASSESSORS' PARCEL MAPPING DATA SET WAS DEVELOPED THROUGH COMPETITIVE PROCUREMENT FUNDED BY MASSGIS. THE SPECIFICATION FOR THIS WORK WAS LEVEL 3 OF THE MASSGIS DIGITAL PARCEL STANDARD. THE FEATURE SERVICE WAS DISTRIBUTED BY MASSGIS ON JANUARY 18, 2022.
3) ALL POINTS (EXCEPT THOSE REFERENCED IN NOTES 4 & 5) WERE LOCATED BY FIELD SURVEYS PERFORMED BY CONTROL POINT ASSOCIATES, INC. ON 05-07-2020 AND 04-08-2021 AND WERE RECORDED IN A PLAN ENTITLED "MONITORING WELL SURVEY GZA GEOENVIRONMENTAL" DATED: 5-15-2020 & REVISED 4-19-2021, FILE NO.: 03-200032, DRAWING NO. 1 OF 1.
4) THE LOCATION OF (SLUDGE SAMPLE) WAS APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A TRIMBLE GEOXH GPS ON NOVEMBER 21, 2019. THE LOCATIONS OF THE TANK SEDIMENT EXCAVATION BOUNDARY (EB-1 THROUGH EB-16), AND THE POST EXCAVATION SOIL SAMPLES (PE-2, PE-4, & SLOPE MATERIAL 072220) WERE APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A TRIMBLE GEOXH HAND-HELD GPS ON JULY 24, 2020. THE LOCATIONS OF THE DELINEATION SOIL SAMPLES (SS-1, SS-2, SS-4 THROUGH SS-8), AND THE POST EXCAVATION SOIL SAMPLES (PE-1 & PE-5) WERE APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A TRIMBLE GEO7X HAND-HELD GPS ON AUGUST 6-7, 2020. THE LOCATIONS OF SEDIMENT SAMPLES (SED-1A THROUGH SED-7A, SED-1B, SED-2B, SED-3B & SED-1 THROUGH SED-8) WERE APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A GEO7X HAND-HELD GPS BETWEEN SEPTEMBER 28 & OCTOBER 8, 2020. THE LOCATIONS OF SEDIMENT SAMPLES (SED-9 THROUGH SED-28) WERE APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A TRIMBLE GEO7X HAND-HELD GPS ON FEBRUARY 3-5, 2021. THE LOCATIONS OF SEDIMENT SAMPLES (SED-29 THROUGH SED-49) WERE APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A TRIMBLE GEO7X HAND-HELD GPS ON MARCH 11-12, 2021. THE LOCATIONS OF SOIL BORINGS (CMG-B1 & CMG-B2), SEDIMENT SAMPLES (WEST-SED-3, DP SED & SED-3B), TANK SEDIMENT EXCAVATION BOUNDARY (EB-17), DELINEATION SOIL SAMPLE (SS-3), POST EXCAVATION SOIL SAMPLE (PE-3), AND SURFACE WATER SAMPLES (SURFACE-W-2, SURFACE-W-3 & SURFACE-W-4) WERE APPROXIMATELY DETERMINED BY LINE OF SIGHT FROM EXISTING TOPOGRAPHIC AND MAN-MADE FEATURES. THESE DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
5) THE LOCATIONS OF THE "WHITE POND" SURFACE WATER/SEDIMENT SAMPLES (WP-1-EAST, WP-1-CENTER, WP-1-WEST, WP-E, WP-W, WP-S), SURFACE WATER SAMPLE (IP), THE MULTI-DEPTH SURFACE WATER SAMPLES (WP-2, WP-3 & WP-4), AND SEDIMENT SAMPLE SED-W-1 WERE APPROXIMATELY DETERMINED BY GZA PERSONNEL USING A TRIMBLE GEO7X HAND-HELD GPS ON AUGUST 6-7, 2020. THIS DATA SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
6) FLUCTUATIONS IN LOCAL GROUNDWATER ELEVATIONS MAY OCCUR OVER TIME DUE TO RAINFALL, SEASONAL CHANGES IN THE RATE OF EVAPOTRANSPIRATION, RELEASE RATES FROM THE LOCAL DAM, AND OTHER VARIOUS FACTORS.

0 100 200 400 600 SCALE IN FEET

N

Proposed Assessments

- Shallow Overburden Well
- Intermediate Overburden Well
- Deep Overburden Well
- Bedrock Well
- Surface Water and Sediment Sampling Location
- Surface Water Sampling Location
- Remote-Monitoring Gaging Station

664 SUDBURY ROAD
STOW, MASSACHUSETTS

SAMPLING LOCATION PLAN AND
APRIL 7, 2021 GROUNDWATER CONTOURS

PREPARED BY:		PREPARED FOR:	
GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		MASSACHUSETTS DEPARTMENT OF FIRE SERVICES	
PROJ MGR: JEM	REVIEWED BY: DEL	CHECKED BY: MMS	FIGURE 2
DESIGNED BY: JEM	DRAWN BY: JAI / EMD	SCALE: 1 INCH = 200 FT	
DATE: 02-15-2022	PROJECT NO. 01.0174452.00	REVISION NO.	

J:\170,000-179,999\174452\174452-00.SJB\FIGURES\GIS\174452_SamplingLocationPlanAndApril2021GWC_FIG2_20220215.mxd, 2/15/2022, 2:13:58 PM, elaine.donohue

Appendix E UCMR RESULTS FOR HAA9, HAA5, AND HAA6BR

Date	Sample Point	Contaminant	Result (ug/L)	HAA9/HAA5	HAA6Br/HAA9
10/22/2020	86 Powdermill Rd	HAA5	8.4	1.3	0.24
		HAA6Br	2.7		
		HAA9	11.10		
10/22/2020	3 Powdermill Rd	HAA5	8.7	1.5	0.35
		HAA6Br	4.6		
		HAA9	13.3		
10/22/2020	195 Main St	HAA5	10.2	1.3	0.24
		HAA6Br	3.3		
		HAA9	13.50		
10/22/2020	12 Winter St	HAA5	38.90	1.3	0.22
		HAA6Br	10.80		
		HAA9	48.90		
4/14/2020	86 Powdermill Rd	HAA5	12.1	1.7	0.40
		HAA6Br	7.9		
		HAA9	20		
4/14/2020	3 Powdermill Rd	HAA5	14.92	1.6	0.40
		HAA6Br	9.68		
		HAA9	24.22		
4/14/2020	195 Main St	HAA5	2.5	1.5	0.33
		HAA6Br	1.21		
		HAA9	3.71		
4/14/2020	12 Winter St	HAA5	12.26	1.5	0.35
		HAA6Br	6.39		
		HAA9	18.09		

Appendix F COST OF PRIORITIZED PROJECTS

No.	Expense Item	Estimated Expense
1	Orthophosphate Corrosion Control, First Year of Monitoring Plan, and Assessment of Switch to Blended Orthophosphate	$ 40,000
2	Distribution System Master Planning	$ 100,000
a	Update Hydraulic Model and develop a Unidirectional Flushing Program	$ 75,000
b	Distribution System Water Quality Study	$ 20,000
c	Distribution System Prioritized Improvements*	$ 2,500,000
3	Construction of Green Meadow KMnO4 System	$ 300,000
4	OMR & GM Treatment Feasibility Testing	$ 60,000
5	Pilot Testing Green Meadow and Old Marlboro Road	$ 800,000
6	Pilot Testing Rockland WTP	$ 650,000
7	New Well Development Rockland Avenue Site	$ 650,000
8	New Well Development Old Marlboro Road	$ 580,000
9	MWRA MetroWest Feasibility Study	$ 100,000
10	MWRA Connection Water Quality Study and Pipe Loop	$ 200,000
11	Design & Permitting of Rockland WTP	$ 1,200,000
12	Design & Permitting of OMR WTP	$ 4,700,000
13	Construction of Rockland WTP	$ 8,000,000
14	Construction of OMR WTP	$ 47,000,000
15	Master Plan 10-Year Update	$ 200,000
	Project Total	$ 67,175,000

EC-SDC Grant supported

*$250,000 annually for ten years