Duxbury Water System Master Plan Overview and Q&A

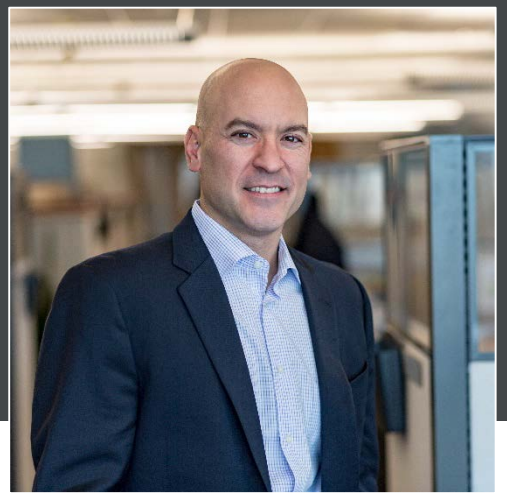
Select Board Meeting

June 12, 2023

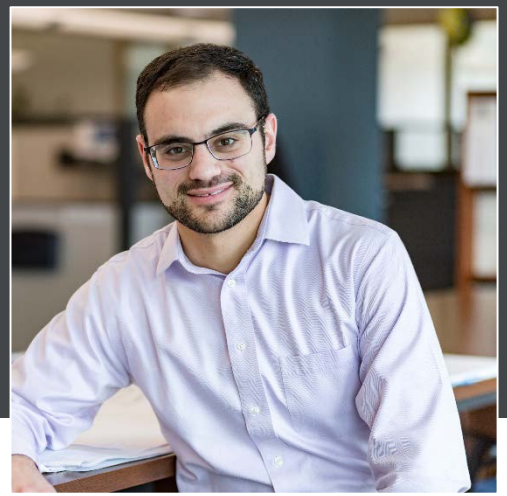
ENVIRONMENTAL PARTNERS

— An Apex Company —

PRESENTERS



Ryan Trahan
PRESIDENT
rjt@envpartners.com



Adam Kran
SENIOR PROJECT MANAGER
ask@envpartners.com

AGENDA

- Background on EP and DPW Work to Date
- Duxbury Water System Master Plan Summary
- Capital Improvement Plan Recommendations
- Pre-Submitted Q&A
- Open Q&A

BACKGROUND

ABOUT EP

Environmental Partners (EP), an Apex company, is an award-winning multidisciplinary engineering and consulting firm celebrating its 24th year in business. With a team of over 80 professionals, EP provides a broad range of services to municipal clients as well as commercial, industrial, and institutional clients

OFFICE LOCATIONS

[HQ] Quincy, MA

Woburn, MA

Hyannis, MA

Middletown, CT

SERVICES INCLUDE

Civil Engineering

Construction Management

Drinking Water

Emergency Management Services

Environmental

Infrastructure Asset Management

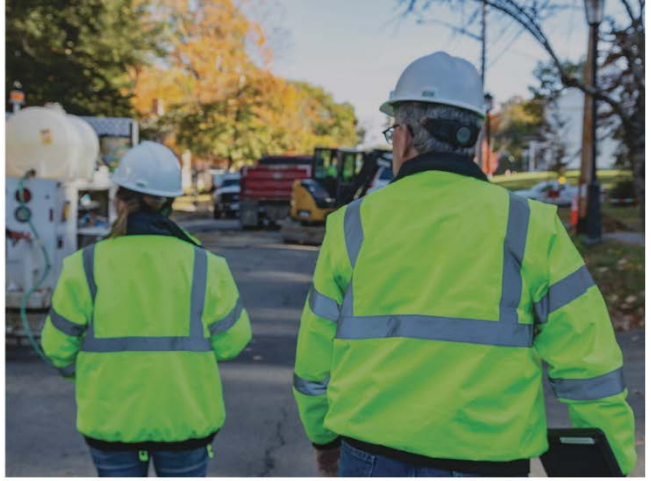
Owner's Project Management (OPM)

Planning

Stormwater

Traffic & Transportation

Wastewater



HISTORY OF WATER DEPARTMENT PROJECTS WITH EP

Environmental Partners (EP) has a long history of providing design, permitting, and construction phase services to the Duxbury Water Department.

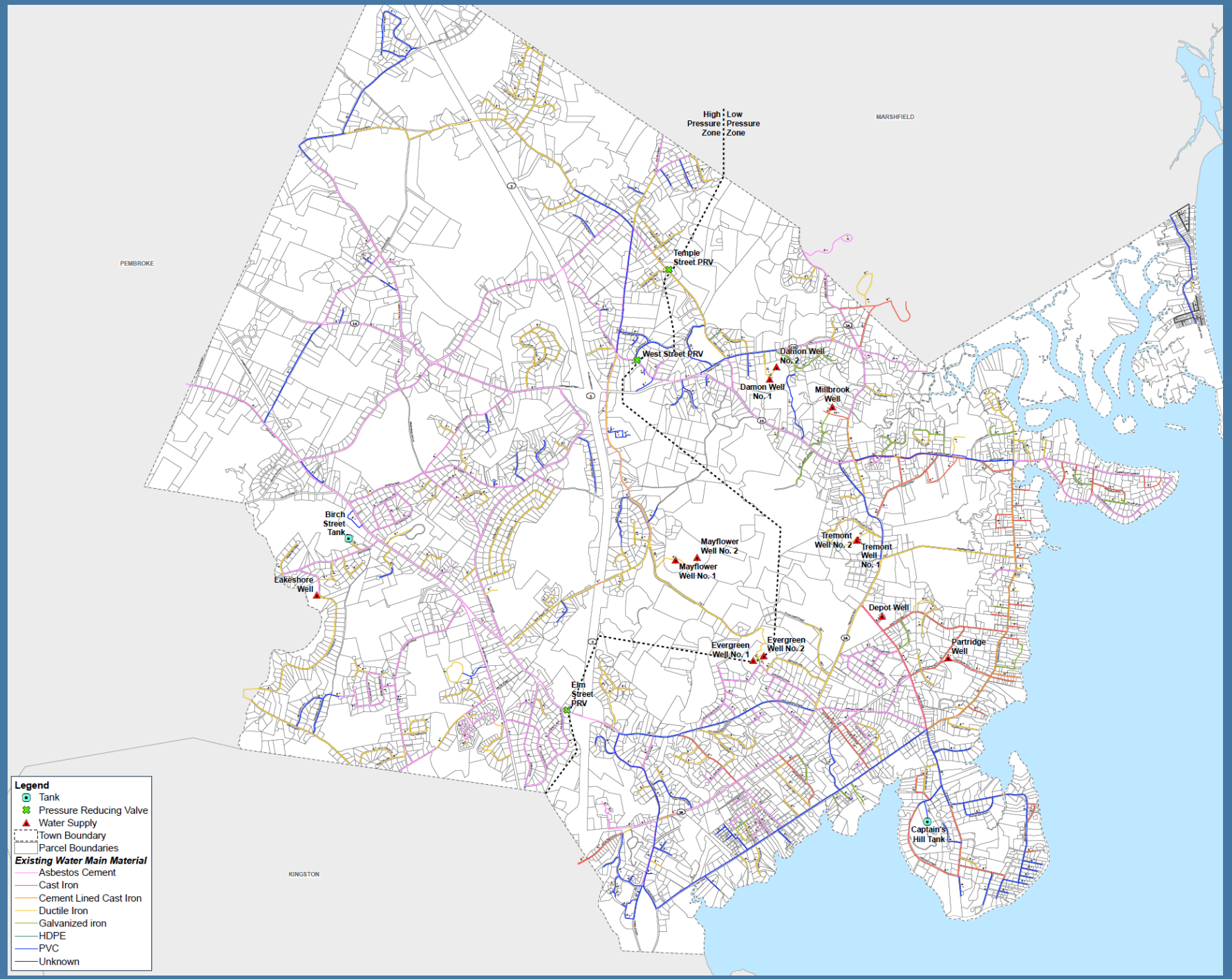
- Water Main Replacements
  - Pine Street
  - Boxwood Lane
  - Cranberry Drive/Trout Farm Road
  - Temple Street
  - PCE Water Main Replacement Project
- Hydraulic Model Development & Updates
  - Subdivision Hydraulic Analyses
- Captain's Hill Tank Rehabilitation
- Well Rehabilitations
- Water System Master Plan (2022)

DUXBURY WATER SYSTEM MASTER PLAN

SYSTEM DESCRIPTION

- Approximately 16,445 customers
- 12 groundwater wells
- 9 treatment facilities
- 2 pressure zones
- 2 storage tanks
- 3 pressure reducing valve stations

Material	Length		
	(feet)	(miles)	Percent
AC	242,266	45.9	36.5%
CI	67,113	12.7	10.1%
CLCI	13,305	2.5	2.0%
DI	186,970	35.4	28.2%
Galvanized Iron	21,418	4.1	3.2%
HDPE	472	0.1	0.1%
PVC	131,905	25.0	19.9%
Total	**663,449**	**125.7**	**100%**

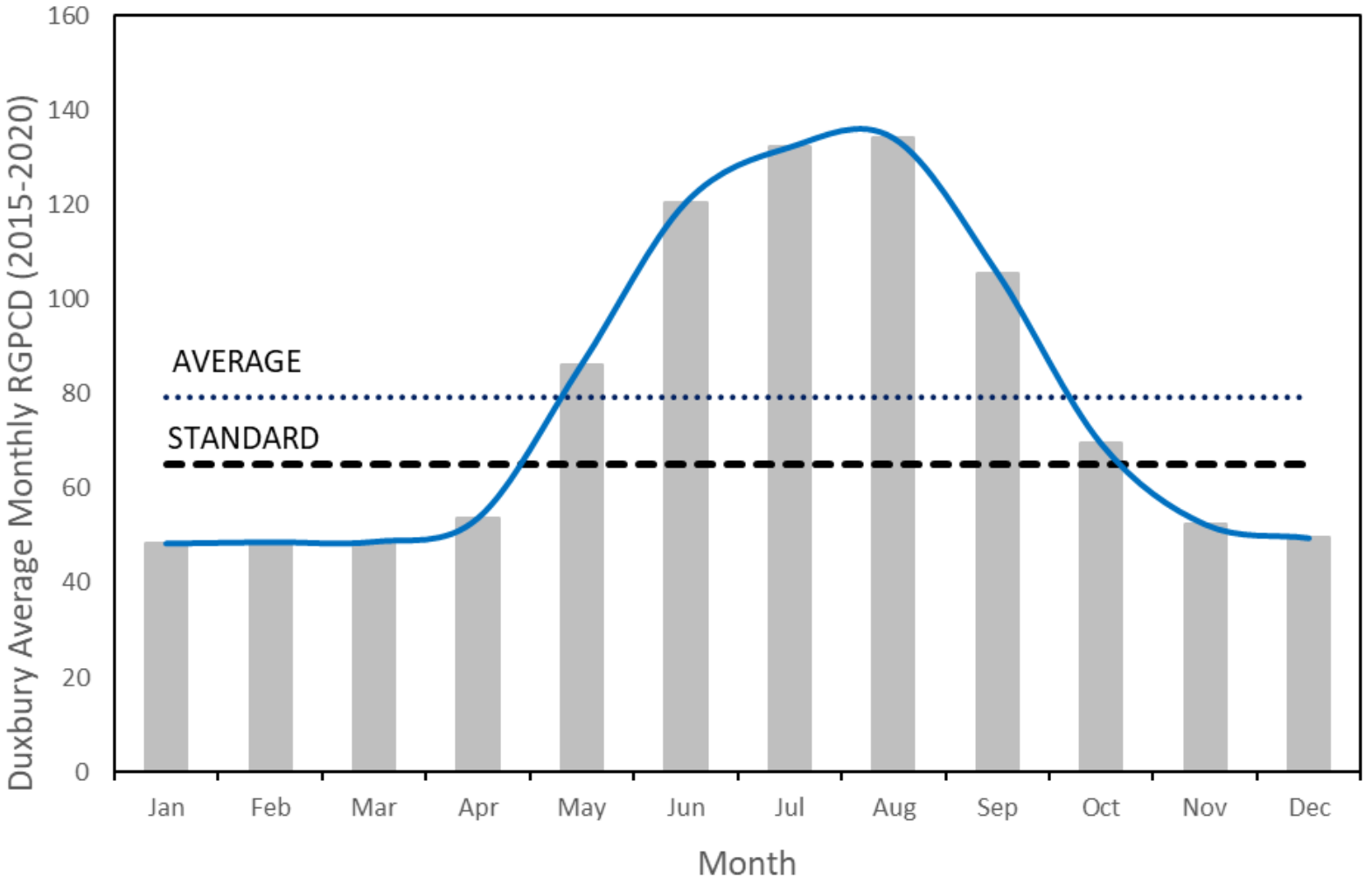

High Pressure Zone
Low Pressure Zone
MARSHFIELD
PEMBROKE
KINGSTON
Temple Street PRV
West Street PRV
Damon Well No. 2
Damon Well No. 1
Millbrook Well
Birch Street Tank
Lakeshore Well
Mayflower Well No. 2
Mayflower Well No. 1
Tremont Well No. 2
Tremont Well No. 1
Depot Well
Evergreen Well No. 1
Evergreen Well No. 2
Partridge Well
Elm Street PRV
Captain's Hill Tank
Legend
Tank
Pressure Reducing Valve
Water Supply
Town Boundary
Parcel Boundaries
Existing Water Main Material
Asbestos Cement
Cast Iron
Cement Lined Cast Iron
Ductile Iron
Galvanized iron
HDPE
PVC
Unknown

SUPPLY & DEMAND

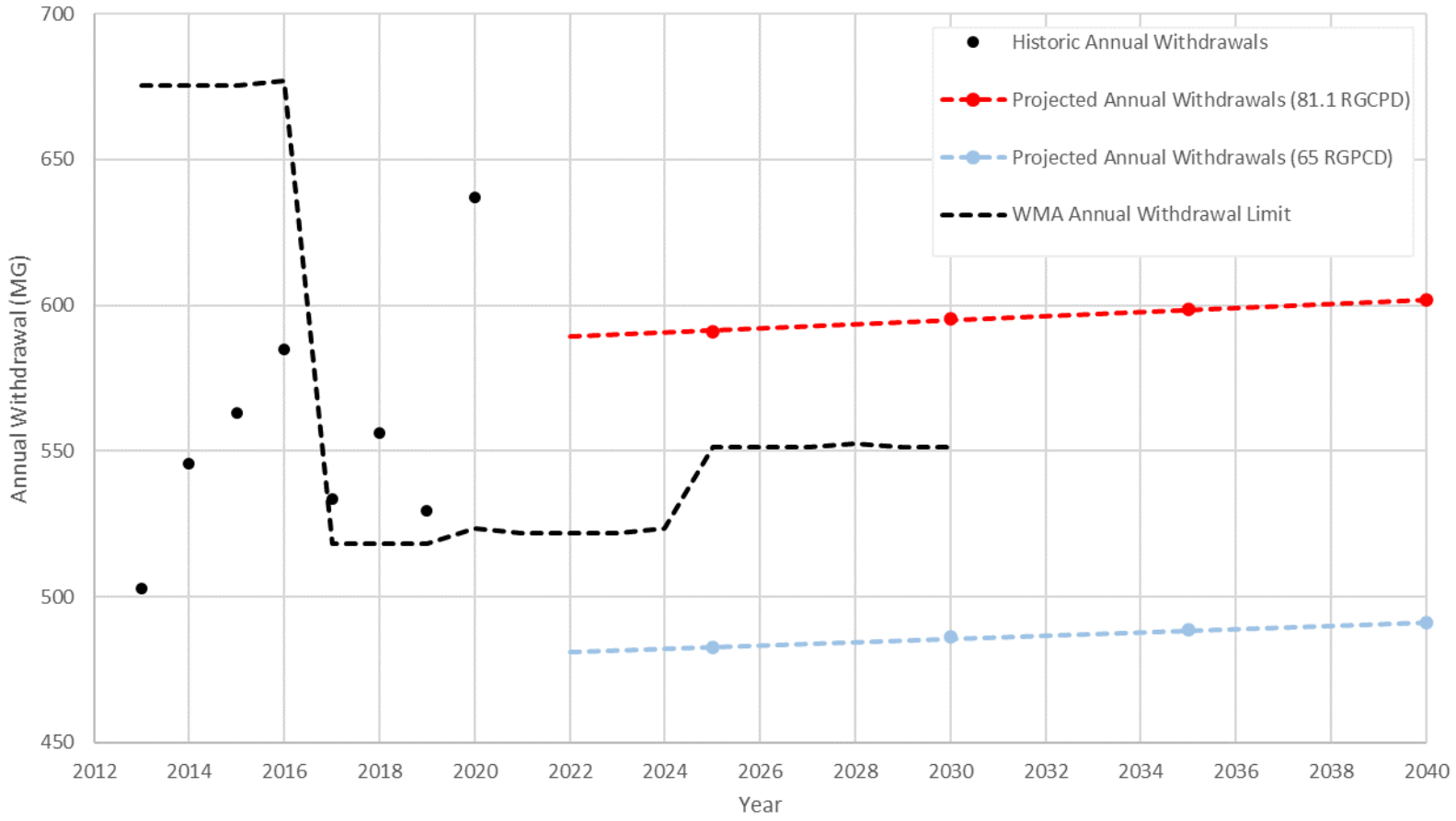
Source Name	Maximum Daily Withdrawal Limit (MGD)	Operational Capacity (MGD)	Supply Capacity (MGD)
Tremont Well No. 1	1.008	0.540	0.9
Tremont Well No. 2		0.360	
Evergreen St. Well No. 1	0.792	0.576	0.576
Evergreen St. Well No. 2	0.792	0.576	0.576
Mayflower Well No. 1	0.72	0.576	0.576
Mayflower Well No. 2	0.72	0.576	0.576
Damon Well No. 1	0.4	0.360	0.360
Damon Well No. 2	0.4	0.504	0.400
Lake Shore Dr. Well	0.504	0.504	0.504
Depot St. Well	0.576	0.432	0
Partridge Rd. Well	0.346	0.216	0
Millbrook Pond Well	0.5	0.504	0.500
Total	**6.758**	**5.724**	**4.968**

Year	Maximum-Day Pumping Demand (MGD)	Average-Day Pumping Demand (MGD)	Ratio of Maximum-Day to Average Day
2015	3.43	1.54	2.23
2016	3.70	1.60	2.31
2017	4.63	1.46	3.17
2018	3.81	1.52	2.51
2019	3.28	1.45	2.26
2020	3.56	1.74	2.05
Average	**3.74**	**1.55**	**2.42**

RESIDENTIAL GALLONS PER CAPITA PER DAY (RGPCD)



ANNUAL WITHDRAWAL VS. WMA LIMIT



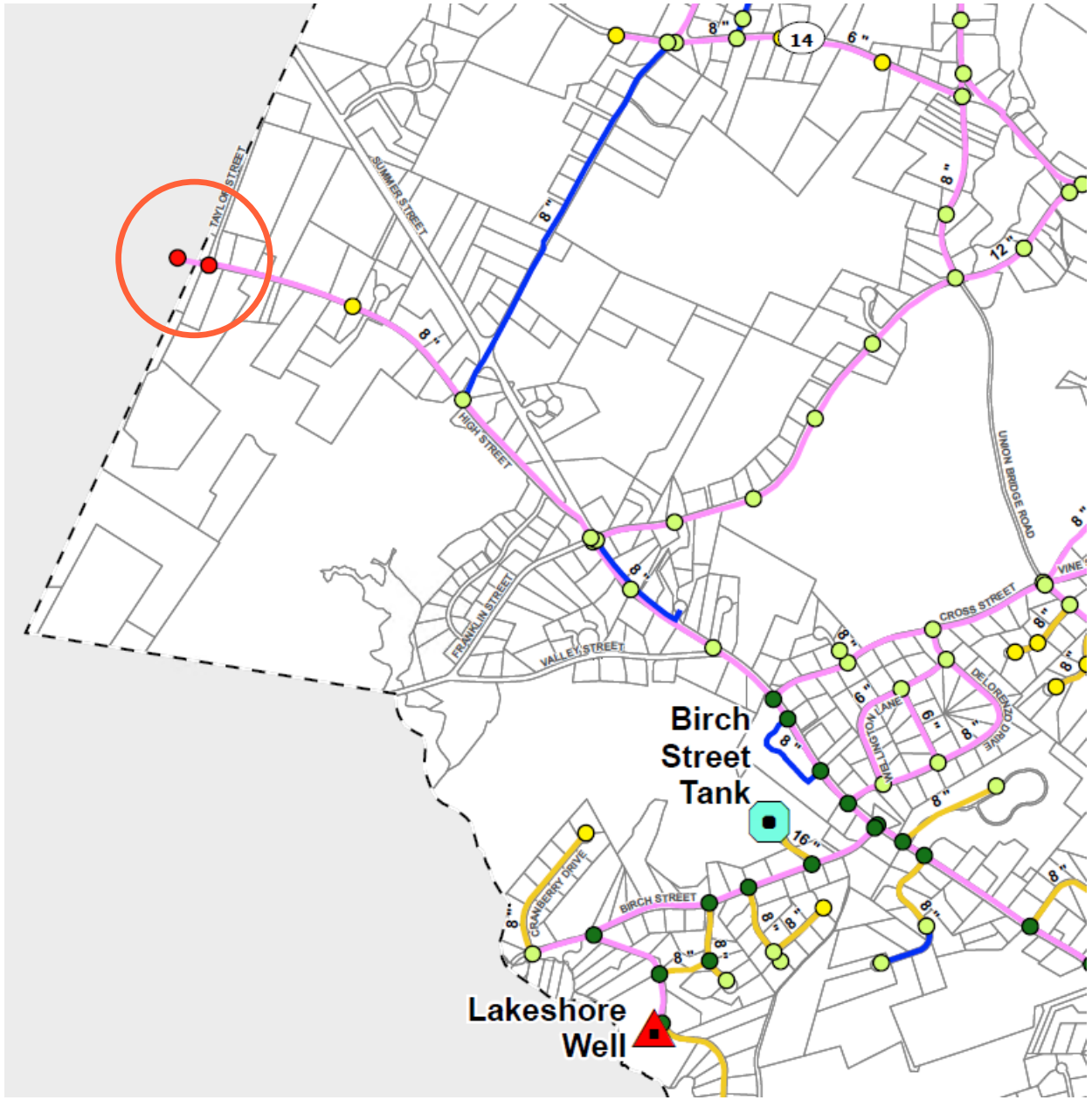
Recommend developing RGPCD/Conservation Plan

STORAGE ASSESSMENT

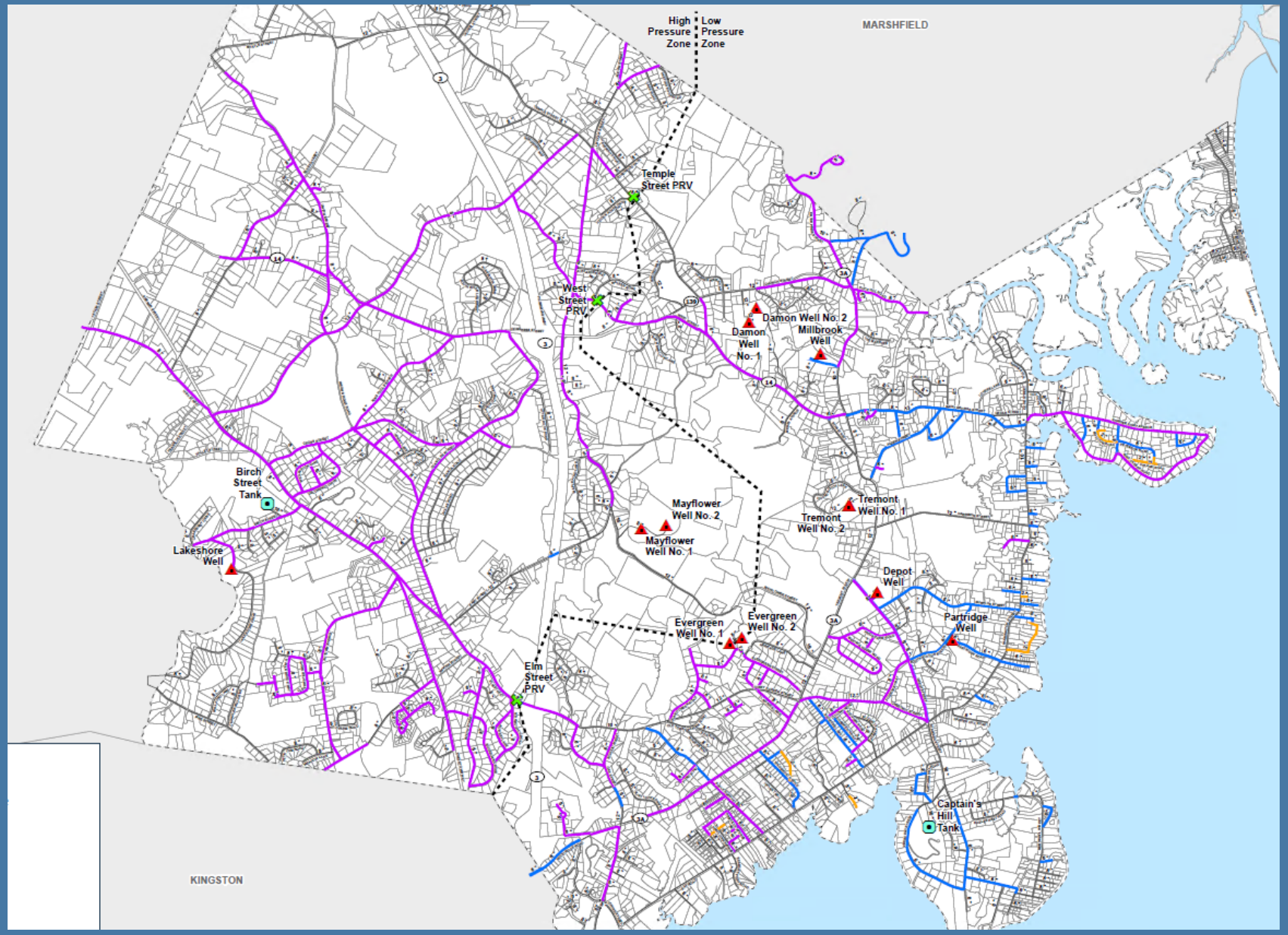
- Two storage facilities
  - Birch Hill
  - Captain's Hill
- Pressure requirements
  - 35 psi typically
  - 20 psi during fire events
- Needed fire storage
  - Up to 3,500 gpm for ISO community rating
  - Taylor & High Street has 6,000 gpm need in high zone
- Conclusions
  - Adequate storage to meet 3,500 gpm fire event
- Recommendations
  - Evaluate supply redundancy in high zone

HYDRAULIC MODEL UPDATES

- Benefits of water system models
- Previous model created in 2011
- Updates
  - Water main upgrades
  - System operations
  - Customer demands
- Steady State Recalibration
  - Hydrant flow tests
  - Static pressures ok
  - Unusual pipe friction factors in high zone
- Recommendation
  - Develop unidirectional flushing (UDF) program
  - Detailed hydraulic study in high zone



NEEDED WATER MAIN UPGRADES



WATER QUALITY

WATER QUALITY OVERVIEW

- Target finished water quality
  - pH 7.0 to 7.8
  - Fluoride 0.5 to 0.9 mg/L
  - Chlorine residual 0.25 to 0.75 mg/L

- Water quality challenges
  - PFAS
  - Iron and manganese
  - Coliform
  - Aluminum
  - Sodium and chloride

EVERGREEN WATER TREATMENT PLANT

PFAS

- EPA occurrence (2013-2015) testing – non detect
- Massachusetts PFAS6 MCL = 20 parts per trillion
- EPA intends to issue draft MCL for PFOA & PFOS

- Impacted sources
  - Partridge Well = as high as 75 – 105 ppt
  - Depot Street Well = 10 – 15 ppt, below PFAS6 MCL

- Recommendations
  - PFAS removal at Partridge Well
  - Reserve space for PFAS treatment for Depot Well

PARTRIDGE ROAD WELL PUMP STATION

IRON AND MANGANESE

- Reviewed historic data and conducted supplemental water quality testing

- Iron
  - Secondary limit of 0.3 mg/L
  - Depot Well, Millbrook Well, Tremont Wells

- Manganese
  - Secondary limit of 0.05 mg/L
  - Mass. Office of Research and Standards Guideline = 0.3 mg/L
  - Depot Well, Millbrook Well, Tremont Wells, Lakeshore Well

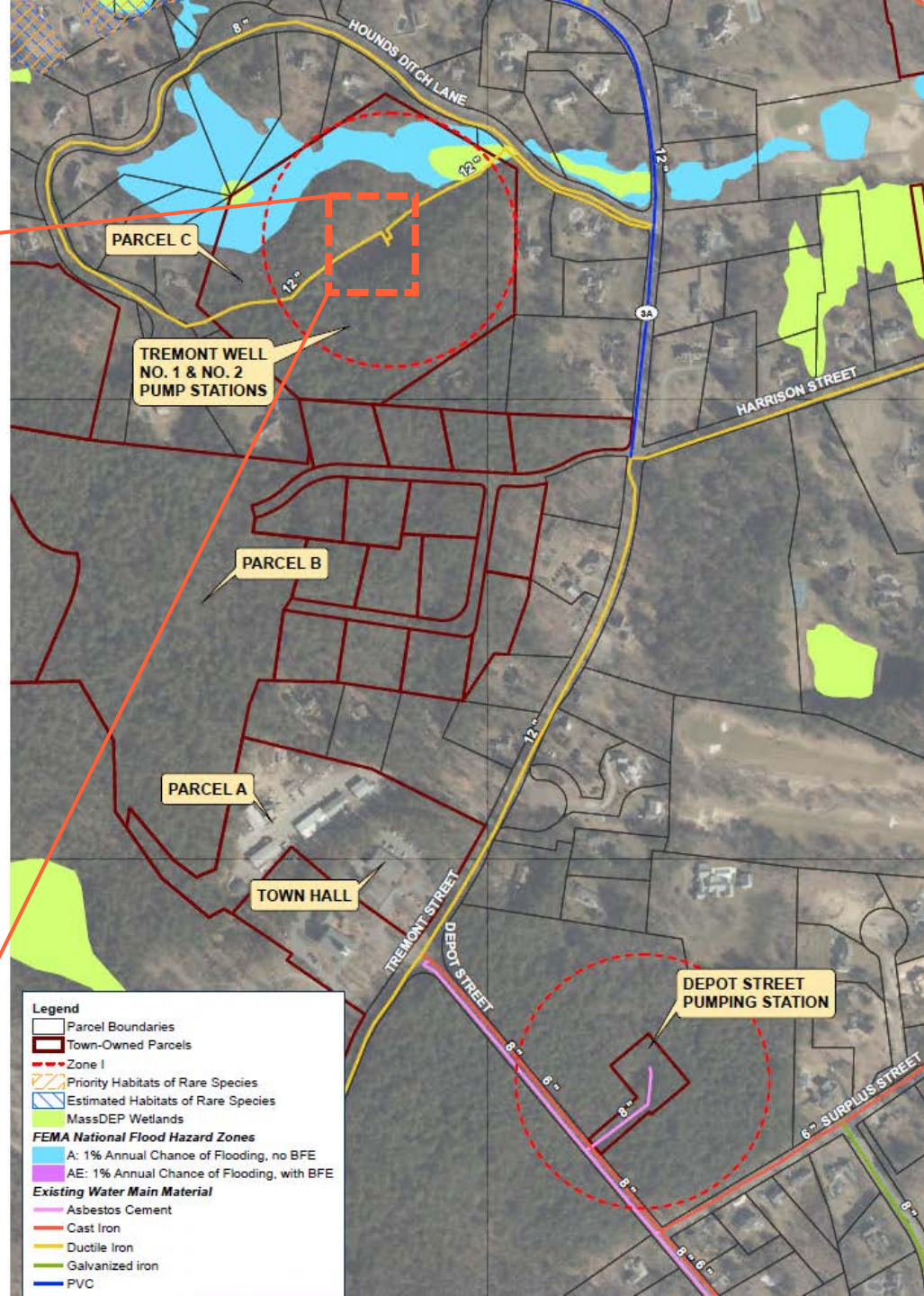
- Evergreen Water Treatment Plant removes both compounds

SEQUESTRATION

- Goal: keep dissolved metals dissolved
- Sodium hexametaphosphate (SHMP)
- Sequestration study
  - Millbrook Well – effective and in use
  - Lakeshore Well – effective but not currently in use
  - Tremont Wells – can be effective but metals removal recommended
- Recommendations
  - Combined metals removal treatment facility for Tremont & Depot Wells
  - Treatment at Lakeshore

TREATMENT PLANT SITING ANALYSIS

TREMONT WELL SITE



CAPITAL IMPROVEMENT PLAN

CAPITAL IMPROVEMENT PLAN – PHASE 1 (FY 2023-2025)

Focus: Regulatory Compliance, Water Quality, Fire Flow Availability

Priority No.	Recommendation	Opinion of Probable Cost
1	Partridge Well PFAS Treatment and PS Upgrades	$2,168,000
2	Lead Service Line Inventory	$50,000
3	Lakeshore Well Treatment and PS Upgrades	$525,000
4	Combined WTP For Depot and Tremont Wells - Phase 1	$500,000
5	High Zone Hydraulics Study and Analysis	$60,000
6	RGPCD Plan/Conservation Plan	$30,000
7	Temple Street PRV Control Restoration	$50,000
8	Unidirectional Flushing Program	$85,000
9	Water Distribution System Improvements - Phase 1	$5,258,000
10	Annual System Maintenance (Section 7.3)	$180,000
	Phase I Improvements Total	**$8,906,000**

CAPITAL IMPROVEMENT PLAN – PHASE 2 (FY 2026-2030)

Focus: Water Quality & System Resiliency

Priority No.	Recommendation	Opinion of Probable Cost
1	Mayflower Well PS Improvements	$450,000
2	Combined WTP for Depot and Tremont Wells - Phase 2	$18,300,000
3	Raw Water Main for Combined WTP	$1,800,000
4	Cybersecurity Improvements	$36,000
5	High Zone Emergency Preparedness Study	$25,000
6	Birch Street Tank Rehabilitation	$1,250,000
7	Water Distribution System Improvements - Phase 2	$4,660,000
8	Annual System Maintenance (Section 7.3)	$240,000
	Phase II Improvements Total	**$26,761,000**

CAPITAL IMPROVEMENT PLAN – PHASE 3 (FY 2031-2035)

Focus: Replacing Aging Pipe Infrastructure & System Resiliency

Priority No.	Recommendation	Opinion of Probable Cost
1	Millbrook Well PS Improvements	$252,000
2	Gurnet Road Area Available Fire Flow Study	$35,000
3	System Controls Study	$50,000
4	New Source Exploration	$100,000
5	Small-Diameter Pipe Replacement	$185,000
6	Cast Iron Water Main Replacement	$11,374,000
7	Annual System Maintenance (Section 7.3)	$300,000
	Phase III Improvements Total	**$12,296,000**

CAPITAL IMPROVEMENT PLAN – PHASE 4 (FY 2036-2040)

Focus: Replacing Aging Pipe Infrastructure

Priority No.	Recommendation	Opinion of Probable Cost
1	Asbestos Cement Water Main Replacement	$10,341,000
2	Annual System Maintenance (Section 7.3)	$300,000
	Phase IV Improvements Total	**$10,641,000**

Q&A

Q/A

- **Q: Do the going-forward projections account for more people now working from home and using more water during the day? In the Demands Forecast in Section 2.4 (pp. 39-43), EP's analysis is based upon observed use through 2020. Haven't things changed since the great reshuffling of the workplace? (ES-4)**
- A: The WSMP's Supply and Demand Analysis was performed using data up to the 2020 ASR. It is possible that usage has changed since the time the analysis was performed for the scope of the WSMP. The WSMP recommended a Water Conservation/Demand Management Plan and this would be analyzed at that time of the study.

- **Q: Also, not included in the Known Future Developments (Table 2-15 on page 41) is the state requirement for the Town to re-zone land for the potential construction of at least 750 new housing units, most of which will be multifamily. I'd like to understand how this may affect the Demand Forecast. (ES-4)**
- A: The WSMP's Supply and Demand Analysis included known future developments as they were reported to EP during discussions with the Duxbury Town Planner and the Duxbury Water Department prior to performing the analysis. Additional developments such as the potential construction described above would increase demands above the WSMP's forecast. However, demands could be offset by recommendations from the Conservation Plan study.

Q/A

- **Q: Will an RGPCD Plan either: (a) tell us anything we don't already know; or (b) offer us potential solutions that we have not already considered? I understand that, regardless, we need to file an RGPCD Plan in order to meet the Functional Equivalence requirements because we consistently exceed 65 RGPCD (as noted on p. 31). (ES-5)**
- A: Correct, this is something that the Department will be required to file regardless due to the high RGPCD. Programs included within the RGPCD Plan such as water saving devices and rebates for low water use appliances may have an impact on water use depending on if they are adopted by customers. Ordinances and restrictions may have some impact depending on compliance, but at the end of the day, if there is no enforcement and the ordinances and restriction are ignored, RGPCD will likely continue to be high.

Q/A

- **Q: What constitutes “agricultural” water use for customer classification purposes, and would a shift toward that classification help with the Town’s compliance calculation? We have a number of farms in Duxbury, along with a surprising number of residential properties that have accessory farm uses (some small, some large), but all of the water runs through the meter at the house. Can we allocate anything to agriculture, and even if we can, would it help? Or is the cap still 65 RGPCD regardless of use?**
- A: We'd have to look deeper at each potential customer and their water use to determine if a reclassification would be a substantial difference, and also research with the State.

Q/A

- **Q: Where is “the site of this high fire demand” referenced in the second paragraph? Is this the High Street/Taylor Street intersection referenced in Section 3.5 (page 53)? (ES-6)**
- A: Correct, High Street and Taylor Street intersection.

- **Q: The Fire Flow Analysis in Table 5-4 (p. 69) identifies six locations that are deficient. One of these appears to be the same one identified above. Are all of these locations “high fire demand” sites?**
- A: Taylor Street and High Street was referred to as a high fire demand site due to the magnitude of its needed fire flow (NFF) value of 6,000 gpm. Other sites on Table 5-4 are much lower, with the next highest NFF value at 4,000 gpm and with most at or below 3,000 gpm.

Q/A

- **Q: I'd like to better understand the risk that the "unknown anomaly" may pose to the model. Is it a significant issue? This is also mentioned in §7.4.5 (p. 121). What are the implications of the elevated pressure losses shown in Chart 4-3? There is discussion about potential blockages and/or unknown valve closures in the high-pressure zone. From a lay perspective, it seems like it could be an issue of concern. Is it? (ES-6)**
- A: Unknown closed valves in water systems present difficulty when performing hydraulic model calibrations. Uncertainty surrounding the location of the source of headloss reduces the reliability of results produced by the model. Calibration of the high zone was attempted as best as possible with the information available but model results, particularly those relating to available fire flows (AFF), may be inaccurate in this area. A closed valve itself may or may not be an immediate concern depending on its impacts to AFF and how high needed fire flows are in the area. Therefore, EP recommended a hydraulic study to determine the cause of the unknown headloss. Once the high pressure zone is recalibrated the model can be used to analyze potential upgrades to address any deficiencies.

Q/A

- **Q: I see that the rationale behind the four phases is described in §7.1, which is helpful. Given the enormous cost overall, are there any cost-effective options to handle some of the treatment issues at the consumer end of the pipe? Or is it all best handled at the enterprise level? (ES-10)**
- A: When all costs, including maintenance and compliance costs are considered, municipalities typically decide treatment is best handled at the source. Duxbury employs certified drinking water operators who maintain treatment equipment and conduct routine testing to demonstrate compliance with drinking water regulations.

Q/A

- **Q: Under Table ES-4, Phase IV Capital Improvements, Priority No. 1 is asbestos cement water main replacement. Figure A-1 in Appendix A shows that much of the Town is still served by asbestos cement mains (Table 1-6 shows 36.5%). How do these differ from the vinyl lined AC pipes? As noted in §4.2.1 (p. 56), the Town has removed the remaining vinyl lined AC pipes. Are the remaining AC pipes safe today, and what are the risks to waiting until FY2036-2040 to replace them? (ES-11)**
- A: In the late 1960s, asbestos cement (AC) pipes were found to produce high alkalinity and poor-tasting water. To address this, AC pipes were vinyl-lined (VL). In the late 1970s it was discovered that VLAC pipe could leach tetrachloroethylene (PCE) into water. Regarding the remaining AC pipes, it's still up for debate if there is any health risk related to the pipes, some EPA studies indicate there may be some risk, while Health Canada and the World Health Organization maintains there is little to no evidence of a hazard of ingested asbestos. However, they do certainly present a risk of failure. Overtime the cementitious bonds in AC pipe erodes and can cause leaks and potentially breaks. Especially in areas with high water tables, the pipe can become prone to breaks and leaks.

Q/A

- **Q: What is the distinction between/among a WTP, a PS, and a "treatment facility?" If a WTP and a PS is each a treatment facility, how do they differ from one another? (Pg. 2)**
- A: Often these terms may end up being used interchangeably. There is no real distinction between a Water Treatment Plant (WTP) versus a Water Treatment Facility (WTF) beyond word choice. A pump station (PS) would typically refer to a pump building which lifts water from a low pressure zone to a higher pressure zone. Surface water sources are often referred to as PS as opposed to Wells which pump groundwater. PS may also be referred to as a treatment facility if the water is being treated there. A distinction between a PS which has treatment, and a WTP is that WTP are often larger and may treat water combined from more than one source or include pressure filtration.

Q/A

- **Q: There are multiple instances of the phrase “0 further discusses” which appears to be a placeholder, presumably for a cross-reference? (Pg. 16-18)**
- A: Yes, these are typographical errors due to a broken cross-reference in word. These were intended to reference the Water Quality and Testing Evaluation section of the WSMP.

- **Q: In §1.9, what is the significance of a right-angle drive regarding backup power? (Pg. 23)**
- A: It is a temporary fuel powered drive that is connected to the pump in the event of a power failure. It is an old method of providing standby power to a well station. New technology and generators allow for seamless and automatic power transfer in times of power loss.

Q/A

- **Q: The storage tanks are fenced and locked. What is our resiliency against harm to the system if someone were to physically access either of the tanks and/or any of the pump stations or treatment plants? How are we protected against the proverbial nut-job or a bad actor from causing contamination and/or interrupting service? Likewise, do we have security information about Marshfield for the water supplied to Gurnet? (Pg. 19)**
- A: MassDEP requires water suppliers to visually and physically inspect storage facilities on pre-determined instances. There are also monitoring devices that help detect variations in pressure and chlorine residual which help identify an emergency situation.

Q/A

- **Q: §1.10.3, para. 2, last sentence: "The PRVs can be monitored and changed…." Should that be PLC? Or do you mean that the PLCs can actually change pressure reducing valves? (Pg. 25)**
- A: The valve solenoids can be controlled via SCADA. These PRVs help deliver water in times of need from the High Zone to the Low Zone. Either in high demand summer periods or emergency needs when fire fighting.

- **Q: How is Duxbury's UAW affected by losses within Marshfield's water system? I thought that no water physically moves between our system and theirs (see p. 27, §2.1)? (Pg. 33)**
- A: Correct, water does not physically move between the two systems. However, water lost due to leaks or metering errors within the Gurnet Road, Green Island Creek, and Careswell Street areas contribute to Duxbury's UAW. This is because the Green Island Creek and Careswell Street areas are served directly by the Duxbury water system but do not have a master meter at the Town boundaries. The Gurnet Road system has a master meter at the Marshfield boundary, so all leaks or meter errors beyond that master meter contribute to Duxbury's UAW.

Q/A

- **Q: In Table 2-5, the 2019 UAW was significantly lower than other years. Do we know why? Can we replicate it? As you mention in Section 2.5.1, "maintaining low UAW is crucial to reducing annual withdrawal volumes." (Pg. 34)**
- A: UAW is reported through the Annual Statistics Reports and includes adjustments for flushing, fire fighting/training and leaks. In some instances, a leak can be found that can lower UAW in one year. Or the iterations of reading and billing meters can fall on dates that straddle a calendar year, and can impact the UAW in comparison to pumped water.

- **Q: What strategies have you seen that are successful in other communities to encourage reductions in residential water use?**
- A: The largest contributing factor to high RGPCD is typically irrigation. If residents do not abide by restrictions on watering and no enforcement is taken, RGPCD will likely stay high. The Town of Pembroke has a bylaw which requires private wells for irrigation and Pembroke's RGPCD has consistently been below the State required level.

Q/A

- **Q: §1.10.4, as well as §7.5.3. I was going to ask about cyber, and I'm glad to see it addressed here. But it doesn't say anything about our existing capabilities. While we cannot disclose sensitive security details in a public document, can we say something here that we currently have industry-standard cybersecurity measures in place? This may be something we discuss in further detail in Executive Session. (Pg. 25)**
- A: The Town has a SCADA consultant that it employs to maintain its system, including security. The Town could request a report from the consultant to provide documentation of the current security measures.

Q/A

- **Q: Does the Town have any liability for maintaining maximum pressures above those that are recommended? That is, do we have any obligation to address it? See §5.4. (Pg. 71)**
- A: Pressures fluctuate throughout water systems every day and every hour. Pressure can vary based on tank level and also if pump or well stations are operating. It is normal for systems to be between 50 – 80 psi, and the limit of 80 psi is a recommendation, not an obligation. High pressures, as noted in the WSMP, can exacerbate leaks and main breaks.

- **Q: The sequestration testing ran for 12 days. How many days does finished water typically remain in the Town's system before use by residents? I assume it varies by location, but is up to 12 days typical? (Pg. 98)**
- A: A water age analysis was not included as a part of the WSMP modeling exercise, but the age of water is different in mostly every part of the water system. Those closest to wells or tanks generally have the lowest water age and those furthest have the longest. Water age also varies by water system, no two towns or systems may be alike given the hydraulics.

Q/A

- **Q: Similar to Question 5 above, as the effectiveness of sequestration degrades over time, do we need a metals removal facility for Wells 1 & 2 (see p. 108), or would it be more cost-effective to install endpoint filters for those users who get the "older" water? (Pg. 98)**
- A: The most effective way to control the water quality impacts of iron/manganese is to remove it through filtration. Sequestering is a solution and has worked historically but you are only controlling the aesthetics of the water. Filtration at the source is the most effective solution, not at the point of use.

Q/A

- **Q: There are references in §6.2.7 (pp. 92-94) about PFOS and PFOA being emerging issues, and here in §6.5.1, there is a recommendation to treat PFAS. Two questions about this:**
- **(a) Are PFAS and PFAS6 the same thing, and if not, shouldn't we assume that the regulations will ultimately cover PFAS6 and plan to treat for all six, not just two? (Pg. 113)**
- A: There are thousands of per- and polyfluoroalkyl substances (PFAS) substances. PFAS6 are the 6 compounds MassDEP currently regulates in drinking water. We'll provide more detail in the PFAS presentation.
- **(b) If we need to treat for PFAS, can those infrastructure improvements also include metals removal (see §6.5.2), since we presumably have to do both? Or do they have to be separate systems? Is this what you are suggesting in §7.5.2, for example? (Pg. 113)**
- A: The filtration process and media is typically different, but they can be done within the same treatment plant or building. Yes, this is what we are proposing to make this a cost-effective solution for the Town.

Q/A

- **Q: What is the rationale for increasing the diameter of small-diameter pipes in §7.6.6? Assuming pressure is adequate as-is, wouldn't this just enable greater volumes (when we're trying to discourage more use)? (Pg. 129)**
- A: Rationale is based on increasing available fire flows. Main replacement would include fire hydrants. MassDEP minimum main size for fire service is 6-inch.

Q/A

- **Q: PFAS at Partridge well - I believe you were meeting with engineers (?) last week. Is this project ready to go forward soon? We have funding for it yes? Will the funding cover the costs? Will there be money left over for other projects?**
- A: Wright Pierce has been engaged to perform treatment design for PFAS removal at the Partridge Well and funding has been received from ARPA. Final costs will be determined after design and it is not anticipated there will be money leftover to fund other treatment.

- **Q: PFAS at other wells - will the Partridge system be fairly easily transferable to the other wells? How soon can these other wells start to be fitted for treatment? Will there be money available through American Rescue Plan and Bipartisan Infrastructure Law? How do we go about requesting this money?**
- A: Technology is similar, but each well has its own water quality challenge. The media useful life and treatment modifications will be slightly different for every well. For example, iron and manganese need to be removed from Depot/Tremont prior to PFAS treatment.

Q/A

- **Q: Are the other improvements delineated in Phase I at least in the planning phase if not already underway? It would seem that we have a number of serious deficiencies and that it would behoove us to move forward in a timely fashion.**
- A: The Partridge Road well was identified immediately during the process and aligned for funding. The RFQ was issued and awarded to Wright Pierce. The Town has instructed EP to begin the initial phases of the Depot/Tremont WTP and we should have a proposal to begin that work for review in June.

Q/A

- **Q: I am going to assume that we had fallen behind somewhat with the resignations in the water department. I believe EP was going to oversee the department. Have they done any of the work that needs to be done?**
- A: EP completed the WSMP Draft and submitted it to the Department in May, 2022. The WSMP is a significant first step in addressing the issues the Department faces and provides capital improvement recommendations and phasing plans to address them. EP is and was available for technical help and advice throughout the transition period.

- **Q: How are you feeling about the staffing levels in the Water Department? When will we be at full staff?**
- A: EP would defer this question to the DPW/Town Manager.

Q/A

- **Q: Can we come up with a plan to actually lower the RGPCD to 65? I believe this is at least in part due to lawn watering. How can we get people to stop watering their lawns? We need to get a good education program going. How to do this…**
- A: Correct, RGPCD is largely a problem due to lawn watering. Ordinance and restrictions are already used. Making sure people are aware is the first step, but it seems the issue is with compliance. If there is no enforcement behind the restrictions, there is nothing to make people follow them. It also takes an active advertisement and public relations plan to help push the news out to the residents.

- **Q: My draft did not include some of the Figures that were supposed to be in Appendix A, specifically Figures A-1 through A-7. Can these be provided?**
- A: These were provided in the original draft in 2022 and again in early 2023.

- **Q: Water quality and quantity issues I am requesting be investigated and addressed in the report and plan.**
- A: Refer to WSMP Water Quality Testing and Evaluation, Evaluation of Supply and Demand, and Recommendations and Capital Improvements Plan sections.

Q/A

- **Q: Land in Duxbury is scarce and there are few large parcels left. 40b developments are driving densities higher, along with the required MBTA zoning, and increased accessory structures being used as second dwellings thus significantly increasing our need for water. Duxbury, once described to me as receiving as much rain as a 'rain forest', has seen a significant decrease in rainfall amounts, especially over the spring and summer months, resulting in frequent, regular water restrictions, and at times, severe emergency water bans. There is a large parcel near duck hill road which straddles the Duxbury/Marshfield line. This property has been in litigation for years and the subject of a contentious 40b. Marshfield currently gets water from Duxbury for their residents in this very area and the Milbrook well site (also in this area) has been closed for years. I have often wondered over the years if this isn't the perfect site for a joint water supply with Marshfield. This may or may not be available, however, there could be an opportunity here. If not this parcel- where else should we be planning. I would much rather have land set aside for this purpose and future use than not.**
- A: Returning the Partridge Street and Depot Street wells back to operation will greatly improve the system's capacity. The overarching supply and demand issue is that residential water use is significantly too high compared to MassDEP standards and the Department's WMA permit. If residential use does not decrease in the coming years, the Department may need to tighten restrictions, more closely monitor compliance, adjust incentives, or potentially add supplemental restrictions. EP recommended a desktop study of Teakettle Lane site and investment in exploration in the CIP.

Q/A

- **Q: Explore and address what other communities are doing regarding either restricting/prohibiting the use of certain lawn/garden fertilizers, chemicals or regulating of same. This includes products such as round-up and lawn fertilizers. This should be explored in relation to the golf courses and municipal grounds as well. Recently residents have expressed a desire to limit the use of pesticides/herbicides on town owned properties. We need to listen to these concerns and develop strategies.**
- **Q: Lawn sizes- what are other communities doing to limit lawn sizes? I would argue that as all 40b developments are a negotiated permit, the reduction of lawn could be implemented immediately by our ZBA - requiring less lawn is doubtful to make the project uneconomical for the developer!**
- **Q: Incentivizing environmentally responsible and drought tolerant landscaping- investigate strategies to incentivize homeowners, developers and businesses to create landscapes that significantly decrease lawn size and utilize drought tolerant native species. Are any towns creating bylaws to require such strategies? I believe that incentives instead of bylaws, such as a discount on your water rate should you use these practices, would be preferred (my opinion).**
- A: These questions require interdepartmental coordination on passing of bylaws. Other Towns have passed similar water balance or restrictive bylaws on use of the water system for irrigation. We can provide some assistance or recommendations if the Board so chooses.

Q/A

- **Q: Explore and offer strategies to limit future contamination of wells from PFAS, PFOA and all contaminates.**
- A: The Town has hired Weston & Sampson for monitoring of the PFAS contamination. This may lead to some recommendations for groundwater remediation, but would defer to them for their opinion.
- **Q: Our water permit with the state is unrealistic and results in constant violation. Thoughts, strategies, proposed legislative remedies? What/how can we remedy this?**
- A: Duxbury's Water Management Act permit is subject to a 65 Residential Gallons per Capita per Day (RGPCD) requirement as this is MassDEP's standard. Many towns across the state consistently have residential water use RGPCD well below this amount. To avoid excessive RGPCD, residents would need to comply with Department use lawn watering restrictions. No remedy exists legislatively since you are in excess of the RGPCD standard.
- **Q: Provide the latest best management practices for managing drainage for both new development and existing conditions. Is it raingardens, retention, detention? Are we using bmp?**
- A: This falls under the purview of the planning department.

Q/A

- **Q: Do we require test/monitoring wells for all new development? Would this be helpful in monitoring future water quality?**
- A: The Department performs regular water quality testing to meet the requirements of the Drinking Water Regulations and monitor its system's water quality.

- **Q: Nitrogen- we are experiencing increased levels of nitrogen predevelopment in our soils, which I imagine therefore effects the water. Often the preexisting levels exceed the post development ppm allowed. What strategies can we use, if any, other than sand filter septic systems? Town has a max allowance of 5ppm.**
- A: The MassDEP standard for nitrate in drinking water is 10 milligrams of nitrate (measured as nitrogen) per liter of drinking water (mg/L). Between 2010 and 2020 none of the sources exceeded 10 mg/L.

Q/A

- **Q: How did we get here? Why have we not raised our Water and Sewer Rates in 12 years? In other words, do we need to look at our governance model? How do we get going to address the list efficiently and effectively and, once done, ensure that we don't end up in the same place?**
- A: It is very common for water system master plans to have a long list of capital needs over a long time period. The Town has performed high-priority main replacements over the last 25 years to remove VLAC pipe from the water system. The master plan scope was crafted understanding the majority of the significant projects for the pipes and tanks have been done, with a focus on water quality. Hence the recommendations of the report. A water rate study will be required to confirm funding available to perform the list of capital improvements in the master plan, as well as the Town's intention to install treatment at every well.

Q&A

THANK YOU

ENVIRONMENTAL PARTNERS

— An Apex Company —