



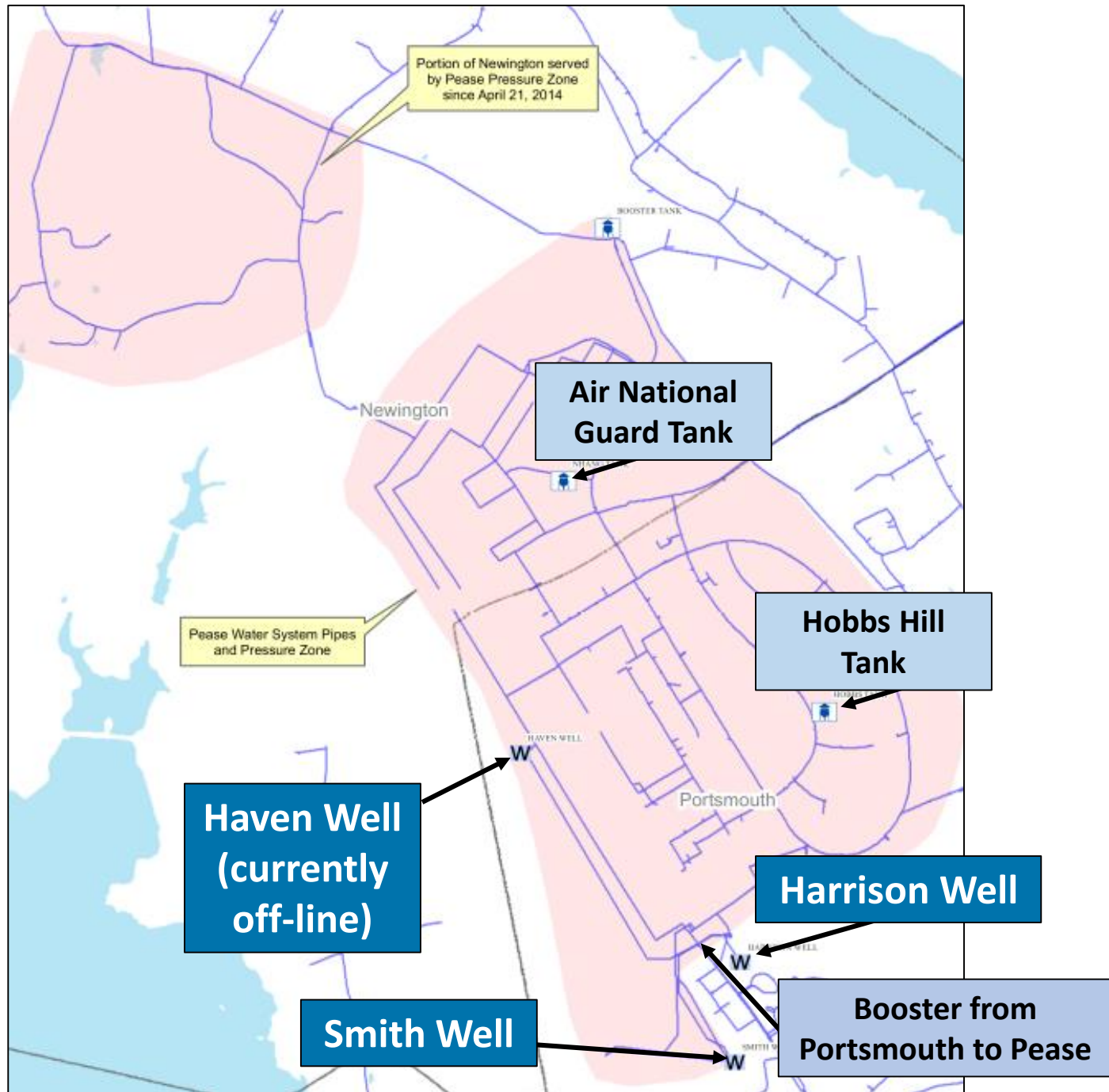
Pease Tradeport Water System: Drinking Water Treatment System Update

City of Portsmouth

Pease RAB
July 26, 2017

Pease Tradeport Water System

- 3 Wells
- 2 Storage Tanks
- Booster from Portsmouth to Pease
- 30 Miles of water main
- 0.4 to 1.0 Million Gallons per Day Usage



Well Treatment – Progress

- **Preliminary Design** – Complete (Feb. 2016)
- **Piloting** – Complete (Sept. 2016)
 - Pilot Report on City Website
- **Demonstration filters for Harrison and Smith Wells** – Current (Online Sept. 2016)
- **Additional preliminary design and assessment of other municipal treatment systems** – Completed June 2017
- **ECT₂ performing a pilot study on resins** – Currently ongoing
- **Final Treatment System Design** – Anticipate August 2017 start (8 month process)

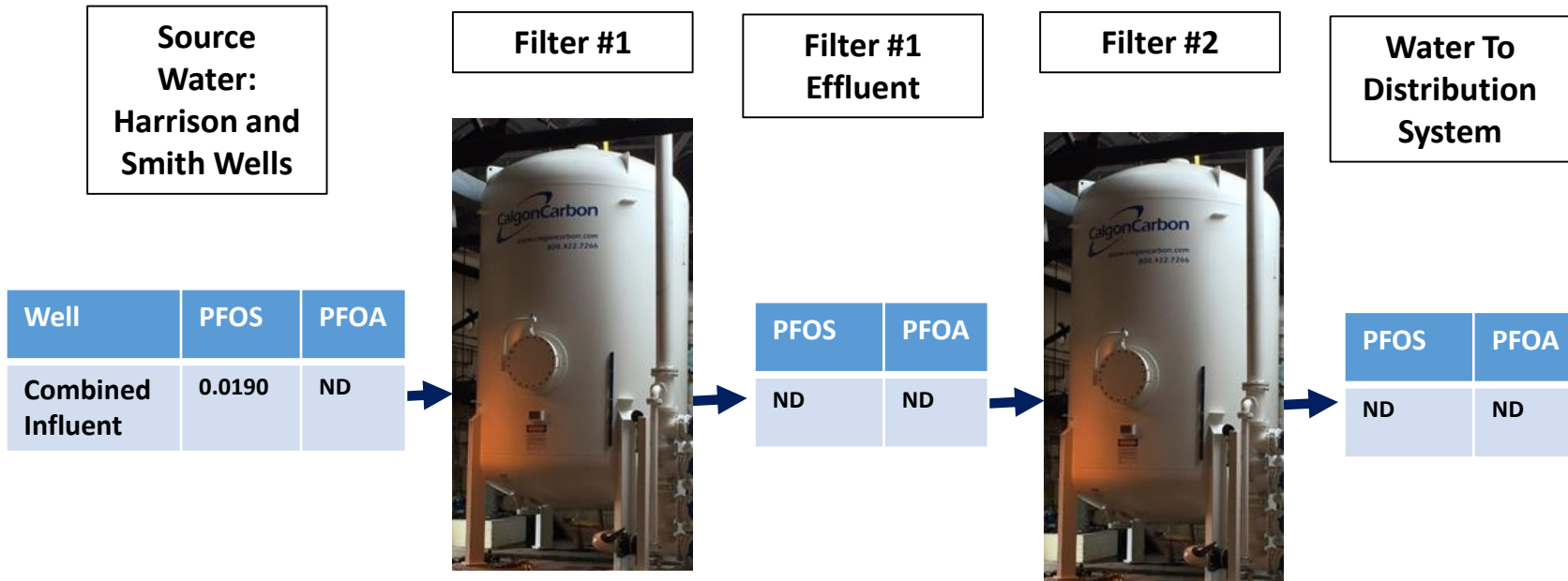
Air Force Agreements to Address the Loss of the Haven Well

- September 2014
 - Hydrogeologic study for replacement well
 - Technical support assistance reimbursement
- November 2015
 - Preliminary Treatment Assessment
- April 2016
 - Treatment Pilot and Demonstration Project – Pilot Complete and Filters were installed Sept 2016
- February 2017
 - Additional Treatment Design Evaluation – “Pease Water Treatment Cost Alternative Report – June 2017”
- July 2017
 - Final Treatment System Design Scope of Work Agreement with Air Force (pending)

Harrison/Smith Well Filters



Pease Tradeport Water System Activated Carbon Treatment Demonstration Project Sampling: June 14, 2017 Results



Notes: All samples in parts-per-billion (ppb)

ND = Non Detect

All samples collected by Weston & Sampson
and analyzed by Maxxam Laboratory

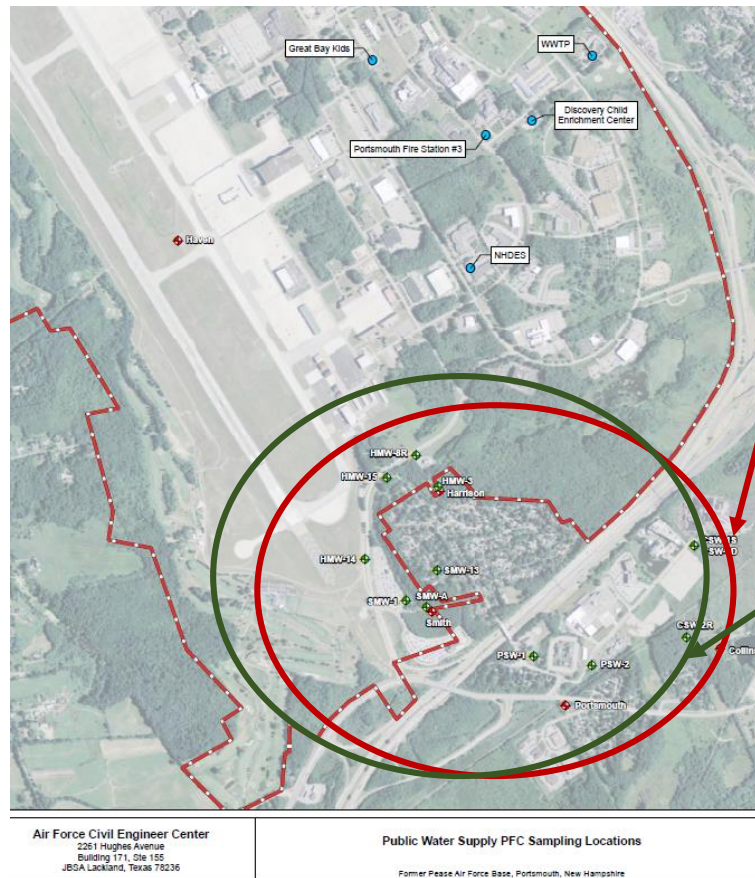
Sample Results – Uploaded to City Website (Testing includes Raw/Well Water Going into Filters)

Table 1
Summary of PFC Analytical Results
Demonstration Project
Former Pease Air Force Base, New Hampshire

Sample Location	Sample ID	Collection Date	6:2 Fluorobromer sulfonate (6:2 FTS)	8:2 Fluorobromer sulfonate (8:2 FTS)	N-Ethyl perfluorooctane sulfonamide (EFOSA)	N-Ethyl perfluorooctane sulfonamideethanol (EFOSE)	N-Methyl Perfluorooctane Sulfonamide (MEFOSA)	N-Methyl Perfluorooctane Sulfonamideethanol (MEFOSE)	Perfluorobutanesulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecane sulfonate (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDDA)	Perfluorooheptane sulfonate (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexanesulfonic acid (PFHS)	Perfluorohexanoic acid (PFHxA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (PFOSA)	Perfluorooctanesulfonic acid (PFOS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorotridecanoic acid (PFTDA)	Perfluoroundecanoic acid (PFUnA)	PFOS+PFOA	
Combined Raw	RAW	14-Jun-17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0230	0.0063 J	0.0055 J	ND	ND	0.0190 J	0.0068 J	ND	ND	ND	ND	ND
Filter 1 - 25%	PV1-25	14-Jun-17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0052 J	ND	ND	ND	ND
Filter 1 Effluent	PV1-100	14-Jun-17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Filter 2 Effluent	PV2-100	14-Jun-17	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

- 21 Rounds of Sampling
- Over 100 million gallons of Harrison/Smith Well Water Filtered to date
- Currently Sampling Raw Water Influent
- June 14, 2017 showed one detection (“J” Flagged as an estimate) of PFPeA at 25% of the first vessel
- Non detections of all PFAS going through second filter

PFAS Monitoring Locations – Air Force Consultant



Production Well Monitoring –
New Schedule with Filters on line:

- Smith – monthly
- Harrison – monthly
- Portsmouth – monthly
- Collins - monthly

Sentry Wells

- 11 Wells - Quarterly

“Sampling data collected since April 2014 shows very consistent concentrations of PFOS/PFOA, no discernible plume movement and no EPA health advisory exceedance.” – Air Force Press Release (July 21, 2017)

NHDES Lab Proficiency Testing

- The City of Portsmouth agreed to participate in the NHDES's Lab Proficiency Testing for PFAS analysis
- Samples of known PFAS compounds were sent to Maxxam Analytics International for testing
- Preliminary results received from Maxxam were good for most of the parameters and compounds
- NHDES will have more information once they have completed their study, which includes sample tests with other laboratories

Public Outreach

- Treatment Design information presented to public at Pease RAB meeting at March 22, 2017 meeting
- Updates on City Website



Pease Tradeport Water Information

Pease International Tradeport Water System Update

The City of Portsmouth's Water Division has been actively working with the United States Air Force (Air Force), the United States Environmental Protection Agency (EPA), and the New Hampshire Department of Environmental Services (DES) in response to the detection of elevated levels of the unregulated contaminant perfluorooctane sulfonic acid (PFOS) from the Haven Well, one of three wells that serves the Pease International Tradeport and the New Hampshire Air National Guard base at Pease. PFOS is one of a class of chemicals known as PFCs or perfluorochemicals. Because the level of PFOS exceeded the "provisional health advisory" set by the EPA, the well was shut down by the City of Portsmouth on May 12, 2014 and since that time it has been physically disconnected from the system. A number of actions have been taken by the project team. The following documents provide additional information:

- [Pease Water Supply and PFC Demonstration Project Update 07.10.17](#)
- [Pease Water Supply and PFC Demonstration Project Update 05.25.17](#)
- [Pease Water Supply and PFC Demonstration Project Update 05.16.17](#)

City of
Portsmouth
Department of Public Works



July 10, 2017

PEASE TRADEPORT WATER SUPPLY UPDATE

Pease Tradeport Water System Activated Carbon Treatment Demonstration Project Sampling: June 14, 2017 Results




Well	PFOS	PFOA
Combined Influent	6.09W	ND
Filter #1	ND	ND
Filter #2	ND	ND
Water To Distribution System	ND	ND

Notes: All samples in parts-per-billion (ppb)
ND = Non Detect
All samples collected by Weston & Sampson and analyzed by Maxxam Laboratory

The activated carbon demonstration filters for the Harrison and Smith wells have been on line since mid-September 2016. The City's engineering consultant continues to sample the performance of the filters based on the volume of flow going through the filters. The graphic above shows the most recent source water sampling and treated filter water quality results for the PFOS and PFOA. A summary of all of the sampling and laboratory results is attached.

Annual Water Quality Report



Annual Water Quality Report

WATER TESTING PERFORMED IN 2016
PEASE TRADEPORT WATER SYSTEM
PWS ID#: 1951020

FROM SOURCE TO TAP

The City of Portsmouth's Department of Public Works (DPW), Water Division, is pleased to present this Annual Water Quality Report to keep you informed about the quality of the water you rely upon every day. This report pertains to customers that receive water from the Pease Water System (USEPA PWS ID# 1951020). This report summarizes the results of drinking water testing performed from January 1 through December 31, 2016, and provides information about the sources of your water supply.

Our mission is to provide the community with a dependable and safe supply of drinking water that meets all current drinking water standards. Portsmouth Water Division staff are constantly monitoring and routinely testing the drinking water in accordance with Federal and State requirements. This ensures the quality of water delivered to customers consistently meets these water quality standards. As new challenges emerge with respect to potential contaminants and impacts from changing weather conditions, we remain vigilant in meeting the goals of water treatment, source water protection, water efficiency, system improvement, fire service capability, and community education, while continuing to serve the needs of all of our water users.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)											
Water From Portsmouth System Supplied As Needed (0% to 50% of Total Pease Supply)											
PER- AND POLYFLUOROALKYL SUBSTANCE (concentrations* reported in ng/L or ppt)	PORTSMOUTH #1 WELL	COLLINS WELL	GREENLAND WELL	HARRISWELL WELL 2	HARRISWELL WELL 3	HARRISWELL WELL 4	BELLAMY RESERVOIR	WATER TREATMENT PLANT	Pease Sources**		Treated Well Water***
									SMITH WELL	HARRISON WELL	POST FAC TREATMENT
# of samples in 2016:	11	12	2	1	2	1	2	1	42	24	7
6:2 Fluorotelomer sulfonate (6:2 FTS)	ND	ND	7	ND	ND	ND	ND	ND	ND	ND	ND
Average	ND	ND	ND to 7	ND	ND	ND	ND	ND	ND	ND	ND
Range	ND	ND	ND to 7	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorobutane-sulfonic acid (PFBS)	4	9	3	4	4	4	4	ND	6	5	ND
Average	ND to 16	ND to 4	4	ND to 4	4	ND to 4	4	ND	ND to 8	ND to 10	ND
Range	ND to 16	ND to 4	4	ND to 4	4	ND to 4	4	ND	ND to 8	ND to 10	ND
Perfluorobutanoic acid (PFBA)	8	9	ND	ND	ND	ND	ND	ND	8	9	ND
Average	ND to 9	ND to 13	ND	ND	ND	ND	ND	ND	ND to 10	ND to 13	ND
Range	ND to 9	ND to 13	ND	ND	ND	ND	ND	ND	ND to 10	ND to 13	ND
Perfluoroheptane sulfonate (PFH7S)	ND	ND	ND	ND	ND	ND	ND	ND	5	7	ND
Average	ND	ND	ND	ND	ND	ND	ND	ND	ND to 8	ND to 10	ND
Range	ND	ND	ND	ND	ND	ND	ND	ND	ND to 8	ND to 10	ND
Perfluoroheptanoic acid (PFHpA)	6	ND	ND	ND	ND	ND	ND	ND	6	9	ND
Average	ND to 8	ND	ND	ND	ND	ND	ND	ND	ND to 8	5 to 14	ND
Range	ND to 8	ND	ND	ND	ND	ND	ND	ND	ND to 8	5 to 14	ND
Perfluorohexane-sulfonic acid (PFHxS)	9	6	6	4	ND	ND	ND	ND	14	28	ND
Average	6 to 12	ND to 8	ND to 6	4	ND	ND	ND	ND	10 to 17	21 to 35	ND
Range	6 to 12	ND to 8	ND to 6	4	ND	ND	ND	ND	10 to 17	21 to 35	ND
Perfluorohexanoic acid (PFHxA)	7	9	ND	ND	ND	ND	ND	ND	6	9	ND
Average	ND to 10	ND to 7	ND	ND	ND	ND	ND	ND	ND to 9	5 to 14	ND
Range	ND to 10	ND to 7	ND	ND	ND	ND	ND	ND	ND to 9	5 to 14	ND
****Perfluorooctane-sulfonic acid (PFOS)	6	6	9	ND	ND	ND	ND	ND	11	24	ND
Average	ND to 8	ND to 7	7 to 14	ND	ND	ND	ND	ND	8 to 18	17 to 29	ND
Range	ND to 8	ND to 7	7 to 14	ND	ND	ND	ND	ND	8 to 18	17 to 29	ND
****Perfluorooctanoic acid (PFOA)	7	6	ND	ND	ND	ND	ND	ND	7	8	ND
Average	ND to 13	ND to 7	ND	ND	ND	ND	ND	ND	ND to 11	ND to 14	ND
Range	ND to 13	ND to 7	ND	ND	ND	ND	ND	ND	ND to 11	ND to 14	ND
Perfluoropentanoic acid (PFPeA)	8	6	6	ND	ND	ND	ND	ND	7	11	ND
Average	ND to 10	ND to 9	ND to 7	ND	ND	ND	ND	ND	ND to 10	5 to 19	ND
Range	ND to 10	ND to 9	ND to 7	ND	ND	ND	ND	ND	ND to 10	5 to 19	ND
**** PFOS + PFOA	10	7	9	ND	ND	ND	ND	ND	14	31	ND
Average	6 to 14	ND to 12	7 to 14	ND	ND	ND	ND	ND	8 to 27	22 to 43	ND
Range	6 to 14	ND to 12	7 to 14	ND	ND	ND	ND	ND	8 to 27	22 to 43	ND

* Due to laboratory analytical method limitations, low concentrations reported for these chemicals are combined values unless the amount measured is above 10 ng/L (ppt).

** Pease well sources. Concentrations are from wells supplied to the Pease system until September 21, 2016. Water from these wells was mixed by 50% with Portsmouth system water prior to treatment installation.

*** Concentrations from post-granular activated carbon (GAC) treatment.

**** EPA method 8330-8-01 and 8330-8-02 for PFOS and PFOA concentration reported or combined in 70 ng/L (ppt).

ND = Not Detected above laboratory method detection limit.

EPA method 8330-8-01 and 8330-8-02 are the methods used.

8:1 Fluorotelomer sulfonate (8:1 FTS), 6:2 Fluorotelomer sulfonate (6:2 FTS), 6:1 Fluorotelomer sulfonate (6:1 FTS), 6:3 Fluorotelomer sulfonate (6:3 FTS), 6:4 Fluorotelomer sulfonate (6:4 FTS), 6:5 Fluorotelomer sulfonate (6:5 FTS), 6:6 Fluorotelomer sulfonate (6:6 FTS), 6:7 Fluorotelomer sulfonate (6:7 FTS), 6:8 Fluorotelomer sulfonate (6:8 FTS), 6:9 Fluorotelomer sulfonate (6:9 FTS), 6:10 Fluorotelomer sulfonate (6:10 FTS), 6:11 Fluorotelomer sulfonate (6:11 FTS), 6:12 Fluorotelomer sulfonate (6:12 FTS), 6:13 Fluorotelomer sulfonate (6:13 FTS), 6:14 Fluorotelomer sulfonate (6:14 FTS), 6:15 Fluorotelomer sulfonate (6:15 FTS), 6:16 Fluorotelomer sulfonate (6:16 FTS), 6:17 Fluorotelomer sulfonate (6:17 FTS), 6:18 Fluorotelomer sulfonate (6:18 FTS), 6:19 Fluorotelomer sulfonate (6:19 FTS), 6:20 Fluorotelomer sulfonate (6:20 FTS), 6:21 Fluorotelomer sulfonate (6:21 FTS), 6:22 Fluorotelomer sulfonate (6:22 FTS), 6:23 Fluorotelomer sulfonate (6:23 FTS), 6:24 Fluorotelomer sulfonate (6:24 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RAB Question:

Are the (GAC) carbon filters really effective in treating (all the types of) PFCs in our drinking water?

- Weston & Sampson June 4, 2017 Letter:

- Full scale testing/piloting is the most accurate representative of final system performance.
- GAC is the most widely used treatment technique for PFAS removal. GAC will remove all PFASs, with carbon being replaced when the target contaminant begins to breakthrough.
- Resin may be effective for PFAS removal, but current full scale implementation is limited. If over time, resin becomes the preferred treatment technique for PFAS, the proposed treatment facility could move from GAC to resin with minimal modification.
- Membranes, in theory, should effectively remove PFASs, however, it is our current understanding that there are no full-scale membrane facilities built for the purpose of removing PFASs. Membrane facilities are complex and difficult to operate and also produce a highly-concentrated waste stream that may be problematic to dispose of.
- All parties involved with this work, NHDES, the US Air Force, EPA, the City, interested stakeholders, and the design team will continue to work on an effective long-term remedy during the upcoming design phase.

Water Research Foundation (WRF) Study - “Treatment Mitigation Strategies for Poly- and Perfluoroalkyl Substances”

- To test for PFOA, PFOS, and other poly- and perfluoroalkyl substances (PFASs), principal investigators Eric R.V. Dickenson and Christopher Higgins evaluated 15 full-scale water treatment systems throughout the country to see how they were dealing with the contamination.
- The WRF found that aeration, chlorine dioxide, dissolved air flotation, coagulation, flocculation, sedimentation, granular filtration, and microfiltration were all ineffective for removing PFASs including PFOA and PFOS.
- Anion exchange was moderately effective in treating PFOA, highly effective for PFOS, and failed to remove several other PFASs.
- Nanofiltration and reverse osmosis proved to be the most effective methods of removing even the smallest PFASs.
- Granular activated carbon (GAC) was shown to be adept at removing most PFASs and it may be the average utility’s best bet for PFOA and PFOS contamination.
- **“In many cases, the most cost-effective treatment for removing PFOA and PFOS will be GAC, though water utilities will need to test GAC to determine site-specific performance,” the WRF said.**

Research of other Public Water Systems with PFAS Contamination

	<i>Treatment Date</i>	<i>Treatment Type</i>	<i>PFAS Concentration (ppb)</i>
Pease (NH)	2016	GAC	Blend PFOA: 0.155 PFOS: 1.134
Aqua America (PA)	N/A	N/A	All PFAS < 0.07
Barnstable (MA)	2015	GAC	PFOA: 0.18 PFOS: 0.11
Bennington (VT)	2016	GAC (POE)	PFOA: 1.0
Hoosick Falls (NY)	2016	GAC	PFOA: 0.45
Horsham (PA)	2016	GAC + Resin	PFOS: 1.0
Issaquah (WA)	2016	GAC	PFOS: 0.40
Joint Base McGuire-Dix-Lakehurst (NJ)	N/A	N/A	Combined PFOA/PFOS<0.07
Little Hocking (OH)	2007	GAC	PFOA: 0.37-21
Merrimack Valley District (NH)	N/A	GAC	PFOA: 0.09
New Castle (DE)	2015	GAC	PFOA: 0.14 PFOS: 1.3
Oakdale (MN)	2006	GAC	PFOA: 0.64 PFOS: 0.71
Oatman (AZ)	-	-	PFOA: 0.032 PFOS: 0.30
Suffolk County (NY)	2016	GAC	PFOA: 0.33 PFOS: 1.7
West Morgan-East Lawrence (AL)	2016	GAC	PFOA: 0.15 PFOS: 0.12
Wurtsmith (MI)	N/A	N/A	Combined PFOA/PFOS<0.07

Air Force sends first \$400,000 filter to Fountain to scrub PFC contamination from ground water

By **BRUCE FINLEY** | bfinley@denverpost.com | The Denver Post
PUBLISHED: June 29, 2017 at 2:55 pm | UPDATED: July 3, 2017 at 10:58 am



Bruce Finley, The Denver Post

A water filter system being delivered in Fountain to purge PFC contamination in the town south of Colorado Springs, on Thursday morning.

Starting in late July, the 500-gallon-per-minute water-filtering systems attached to two of Fountain's four municipal wells will begin to remove PFCs called PFOS and PFOA.

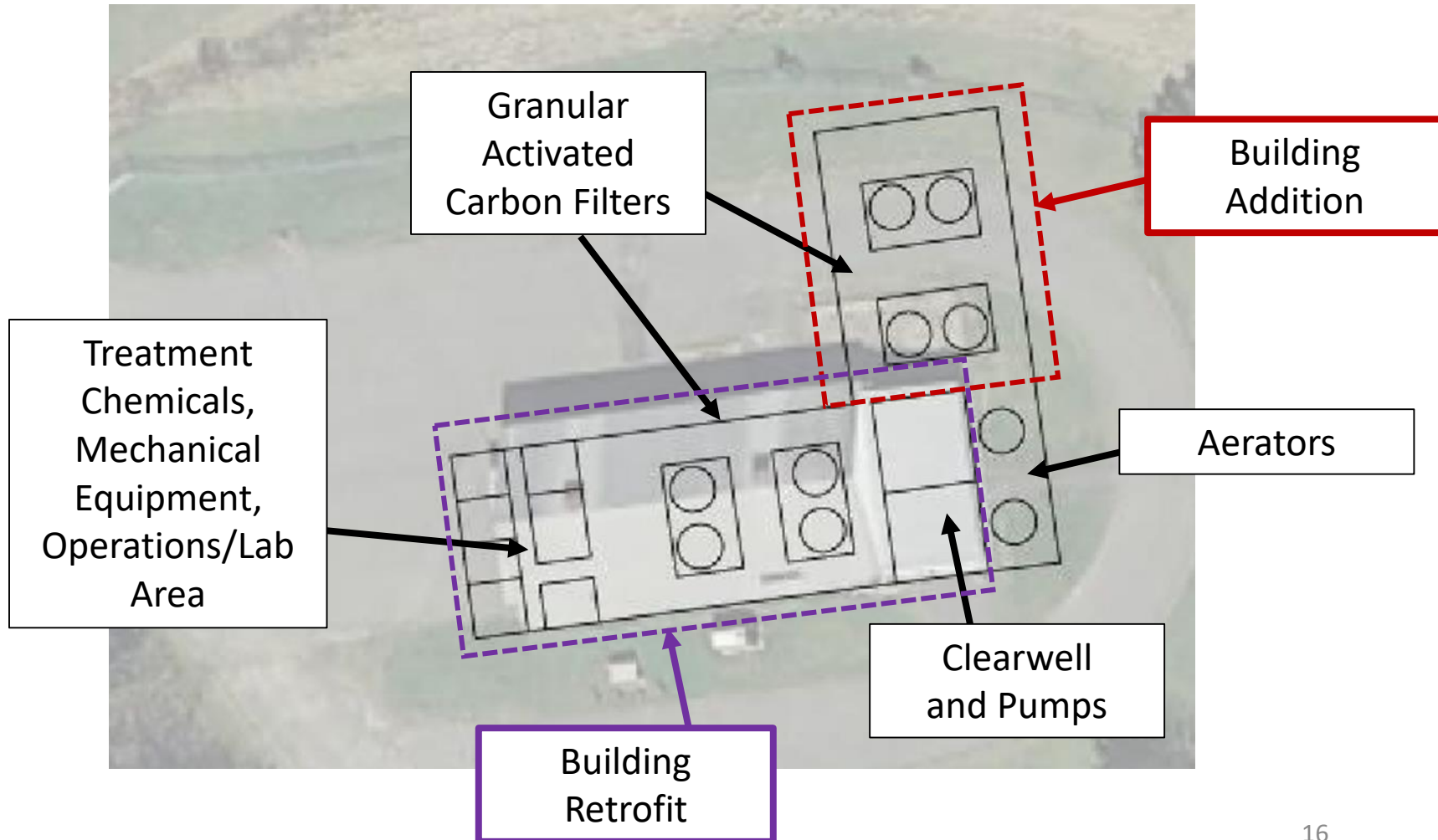
“The EPA has recommended granular activated carbon filtration for PFOS/PFOA treatment, and the Air Force has used GAC systems to successfully treat various contaminants,” Kinkade said. “After installation, we monitor the system to ensure it is reducing PFOS/PFOA levels. And we are working with industry and researchers to identify new technologies to improve our ability to protect human health and the environment.”

It was unclear whether Fountain's filters would remove PFHxS. Karl Kuching, business development for the Air Force contractor TIGG, said the filters have proved successful removing some of the PFHxS at a site in Washington state.

Removing short-chain PFCs may require more frequent changing of the carbon, which is injected into the tops of tanks in a slurry and, when exhausted, drained out the bottoms, he said. Two tanks are used. When system operators detect a contaminant “breakthrough,” one tank still filters out contaminants while carbon in the first tank is replaced.

The effectiveness of carbon filters removing PFCs from contaminated water depends on how frequently the carbon is changed, Colorado School of Mines environmental engineer Chris Higgins said.

Pease Well Treatment System Conceptual Design:



RAB Questions

RAB Questions Regarding Alternative Water Supply Locations:

- **The City routinely performs comprehensive water system master planning**
- These studies looked at:
 - All water system infrastructure
 - Pipeline and water storage needs
 - Water quality and treatment
 - Adequacy of our sources of supply
 - Water Demand Projections
- Recommendations from these studies have been incorporated into the City's long term Capital Improvement Programs (CIP) and many have been completed already.

Water System Master Plans

- 2012
- 2000
- 1994
- 1979



Water Supply Alternatives

- **The activation of the Harrison Well in 2006 to serve the Pease Tradeport System.**
- This well was out of service for a number of years due to mechanical issues. This well was rehabilitated, tested and approved by the NHDES to be reactivated.
- Well has been in service since June 2006.
- It has a design capacity of 286 gallons per minute (412,000 gallons per day).

Harrison Well



Water Supply Alternatives

- **The Madbury Surface Water Treatment Facility replacement in 2011.**
- The 2000 master plan study identified the need for the City to upgrade or replace the aging surface water treatment facility, built in 1957.
- A replacement facility was most feasible.
- Dissolved Air Floatation was found to be the best option after studying and piloting various treatment technologies.
- A new facility was constructed adjacent to the existing one.
- It was brought into service in August 2011 and is capable of treating 4 million gallons of water a day.

Madbury Water Treatment Facility LEED Silver Certification (2011)





Water Supply Alternatives

- **Water Supply Augmentation Study.**
- Emery & Garrett Groundwater, Inc. (EGGI) was selected in 2008 to perform a detailed analysis of potential groundwater supplies within the City of Portsmouth's water service area.
- Their findings selected 17 potential bedrock aquifer sites and 13 potential surficial sand and gravel sites for new wells.
- The study also determined that additional water could be derived from existing wells.

Water Supply Augmentation Study

**SOURCE AUGMENTATION
EXPLORATION OF NEW GROUNDWATER SUPPLIES
CITY OF PORTSMOUTH STUDY AREA**

**CITY OF PORTSMOUTH DEPARTMENT OF PUBLIC WORKS
PORTSMOUTH, NEW HAMPSHIRE**

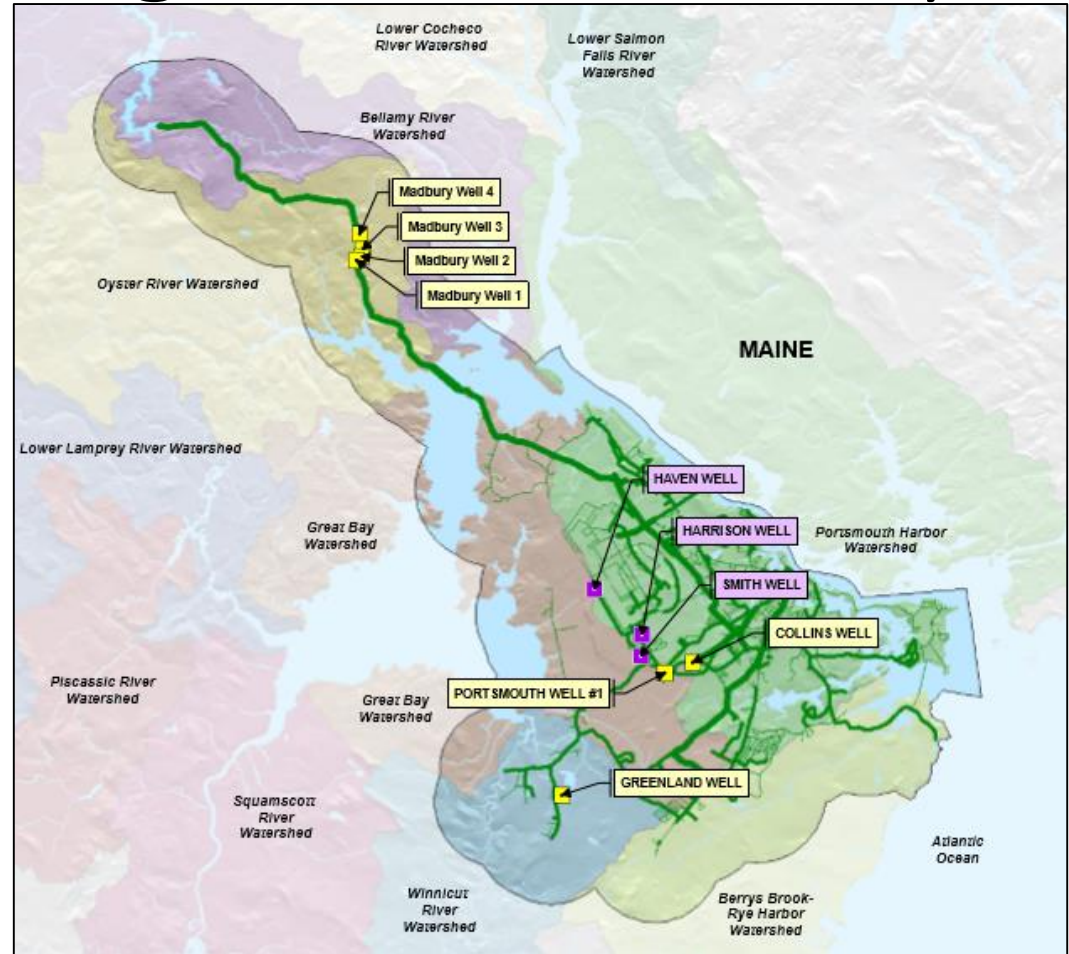



June 2009

Presented to:
**Mr. Peter Rice
City of Portsmouth
Department of Public Works**

EMERY & GARRETT GROUNDWATER, INC.
56 Main Street • P.O. Box 1578
Meredith, New Hampshire 03253

New England Mid-Atlantic South Atlantic



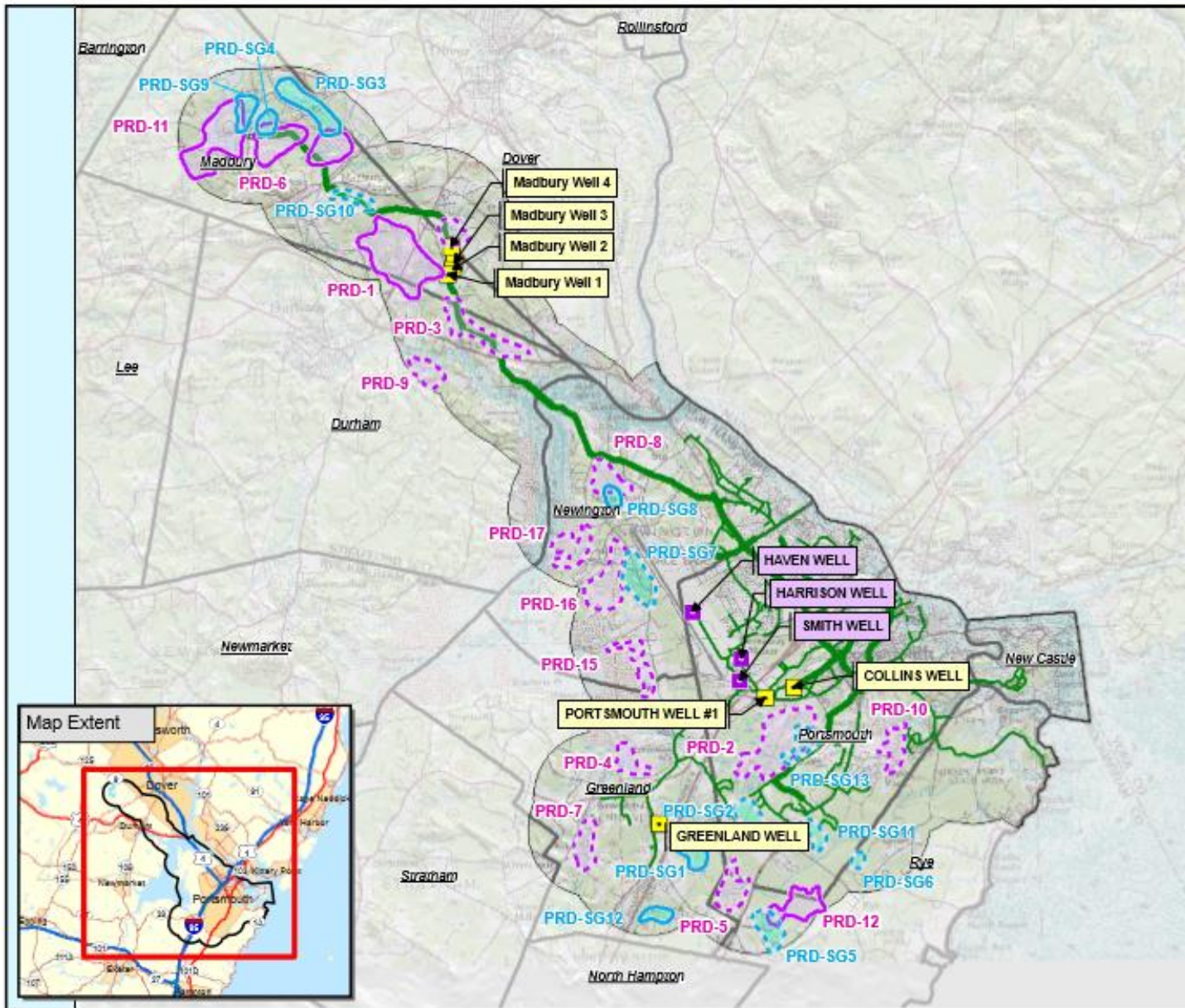


FIGURE 6

Proposed Groundwater Development Zones
Bedrock and Sand & Gravel Aquifer(s)

City of Portsmouth, New Hampshire
Groundwater Exploration Program

Proposed Groundwater Development Zones

SAND & GRAVEL AQUIFER(S)

Potential Groundwater Quality

- More Favorable PRD-SG1, PRD-SG2, PRD-SG4, PRD-SG5, PRD-SG8, PRD-SG9, and PRD-SG12
- Less Favorable PRD-SG2, PRD-SG5, PRD-SG6, PRD-SG7, PRD-SG10, PRD-SG11, and PRD-SG13

BEDROCK AQUIFER(S)

Potential Groundwater Quality

- More Favorable PRD-1, PRD-5, PRD-6, PRD-11, PRD-12, and PRD-14
- Less Favorable PRD-2, PRD-3, PRD-4, PRD-7, PRD-8, PRD-9, PRD-10, PRD-13, PRD-15, PRD-16, and PRD-17

Wells Operated by City of Portsmouth

- Portsmouth Groundwater Supply Wells
- Pease Groundwater Supply Wells
- Regional Groundwater Study Area

Portsmouth Water Pipelines

DIAMETER (inches)

- 10- 13
- 14 - 24

 Town/City Boundary

N

Scale is 1:90,000
1 inch equals 7,500 feet

0 0.5 1 2 3 Kilometers
0 0.5 1 2 3 Miles

FIGURE 6

Emery & Garrett Groundwater, Inc.

Water Supply Alternatives

- **Well upgrades have occurred at the Madbury wells.**
- Drilling of a replacement well for Well #4
- Drilling of an entirely new well (Well #5) to improve operating efficiency of the wellfield.

Well #4 Drilling



Madbury Well #5 Public Hearing



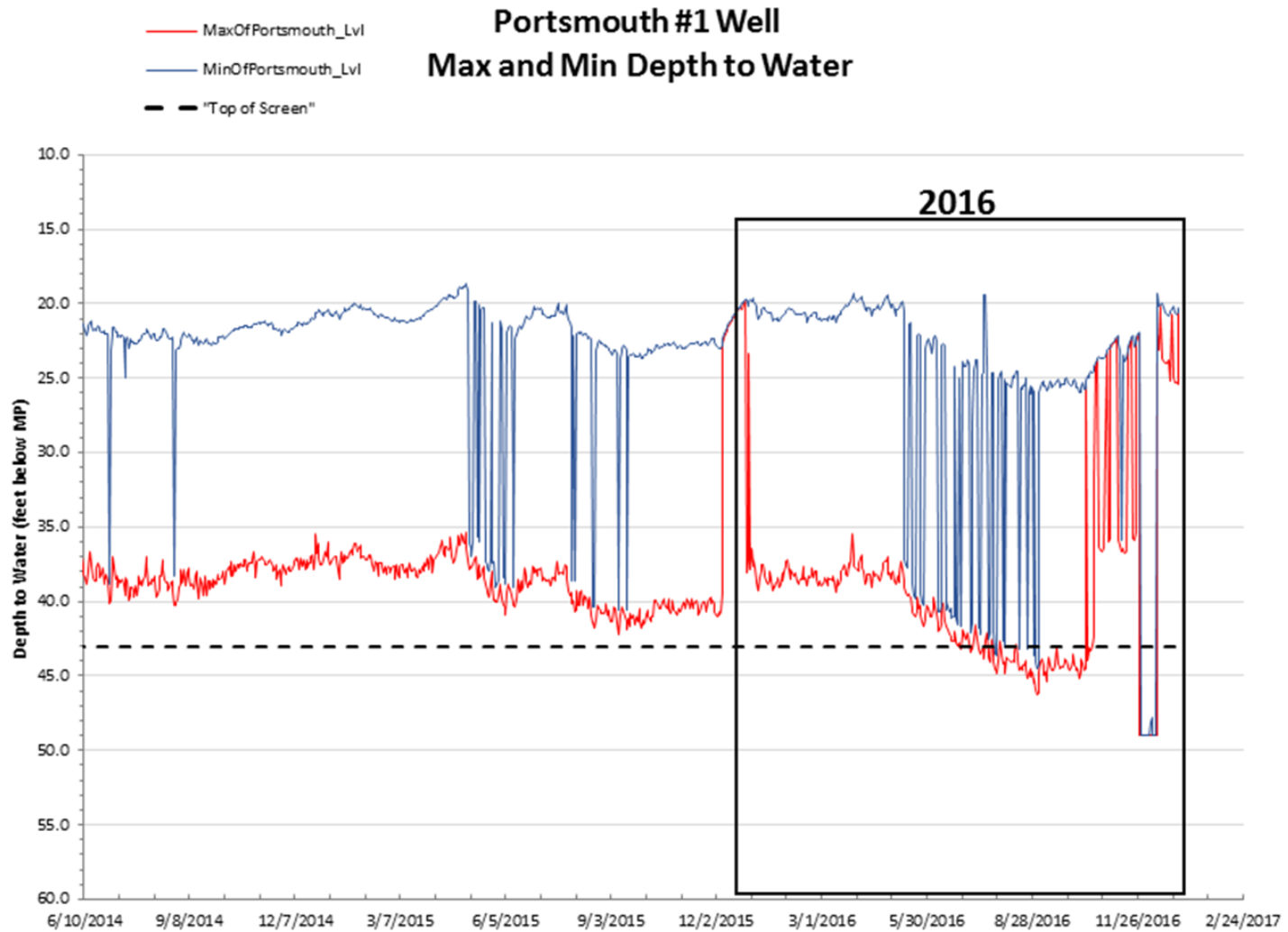
Madbury Well #5 Permitting - Ongoing
Madbury Public Hearing – February 2017

Greenland Well Replacement



New Well in 2015
Pump Station replacement in 2017

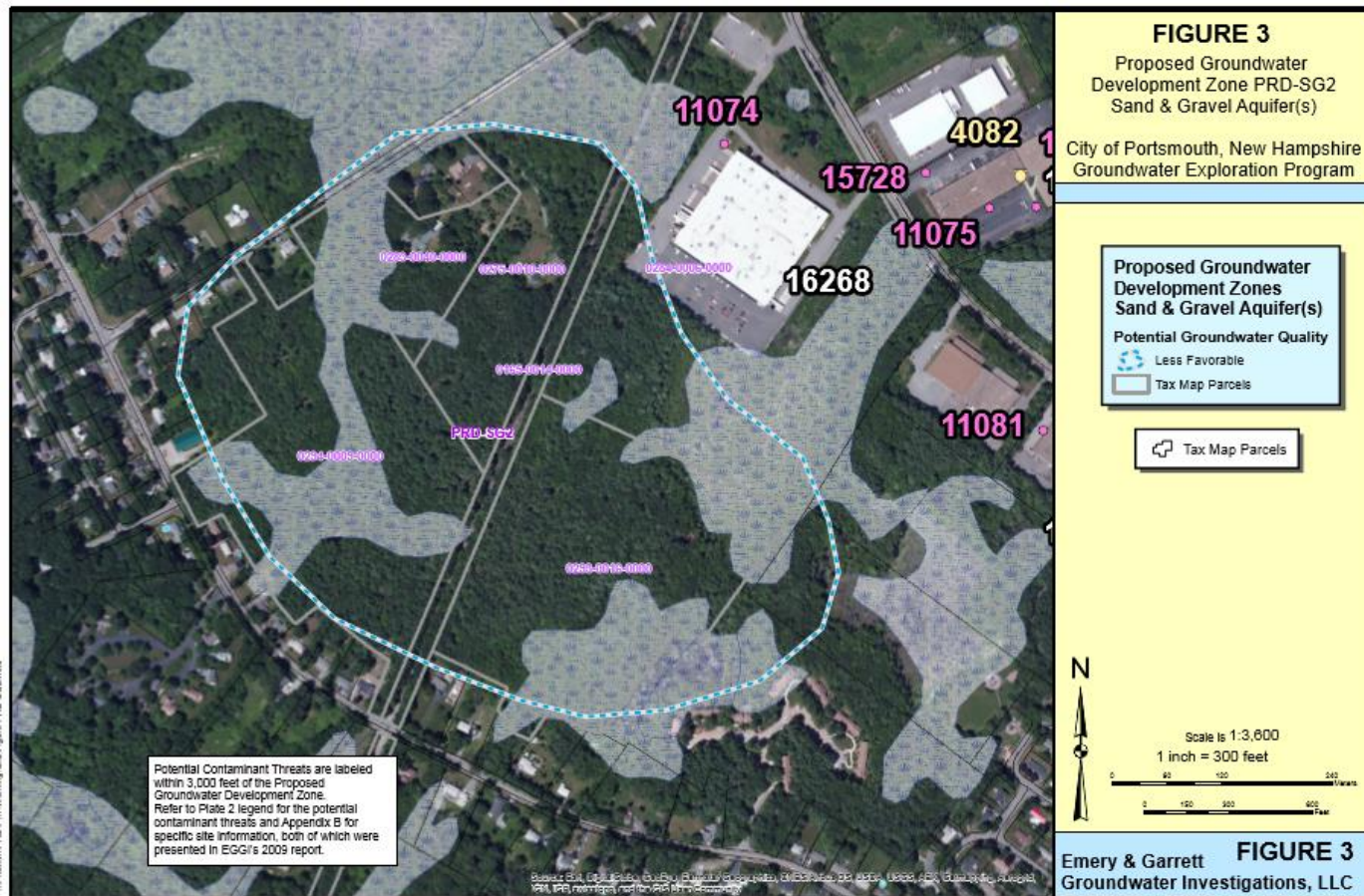
Well Maintenance – Well Cleaning



Water Supply Alternatives

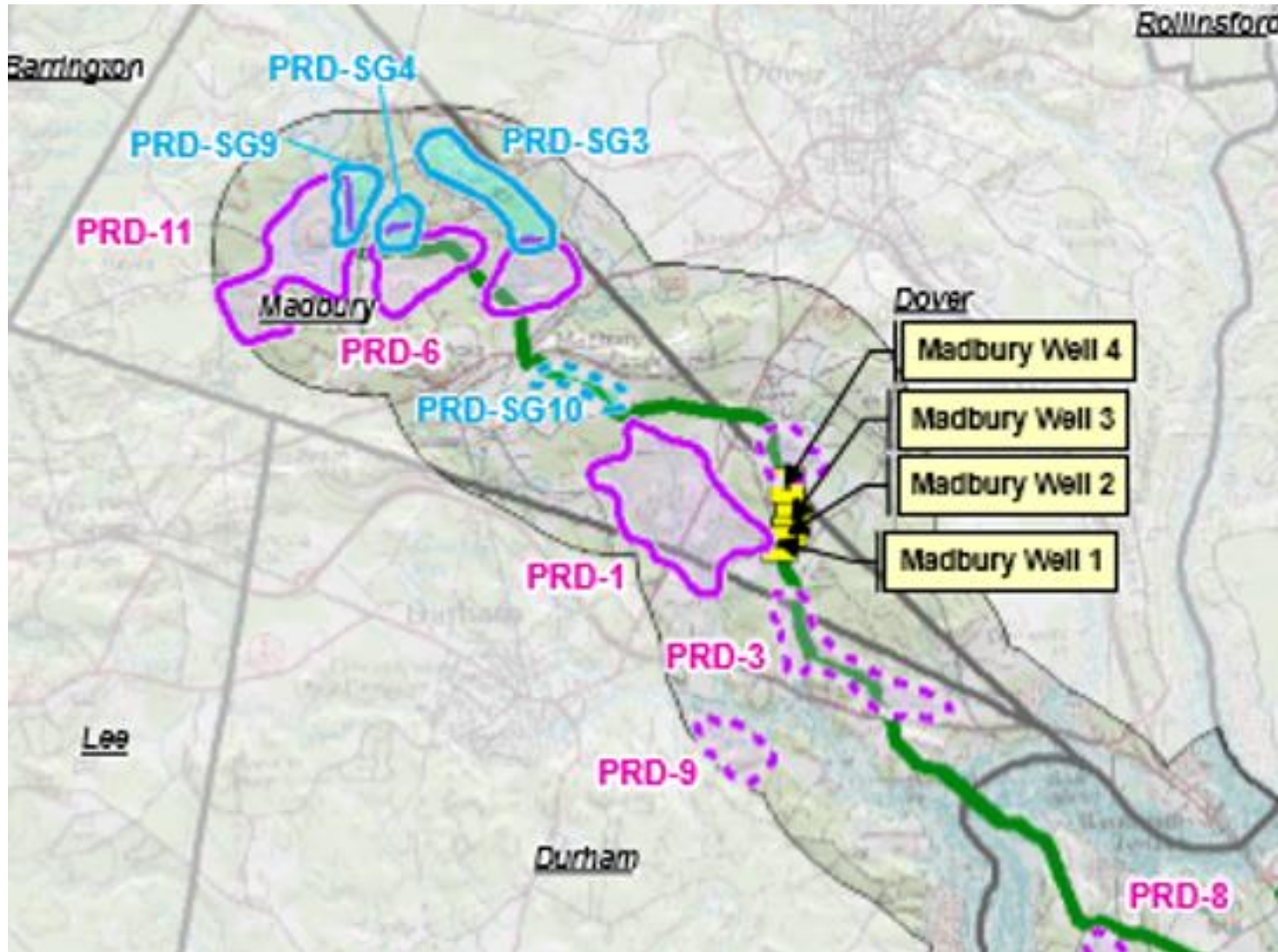
- **Water Supply Augmentation Study – 2014-2016 work associated with the Haven Well contamination.**
- Following the contamination of the Haven Well in 2014, the Air Force agreed to fund additional study on the sites previously identified by EGGI in their 2008 report. The focus of this study was to conduct further evaluation and groundwater testing program, for the purposes of assessing the overall groundwater availability, in the following proposed Groundwater Development Zones: PRD-1, PRD-2, and PRD-SG13.
- Field investigations of these sites took place in late 2014 and early 2015. A report of their findings was issued in May 2015. A follow-up Request for Proposals for performing a test well investigation was issued in 2016. EGGI was again selected to perform this work.

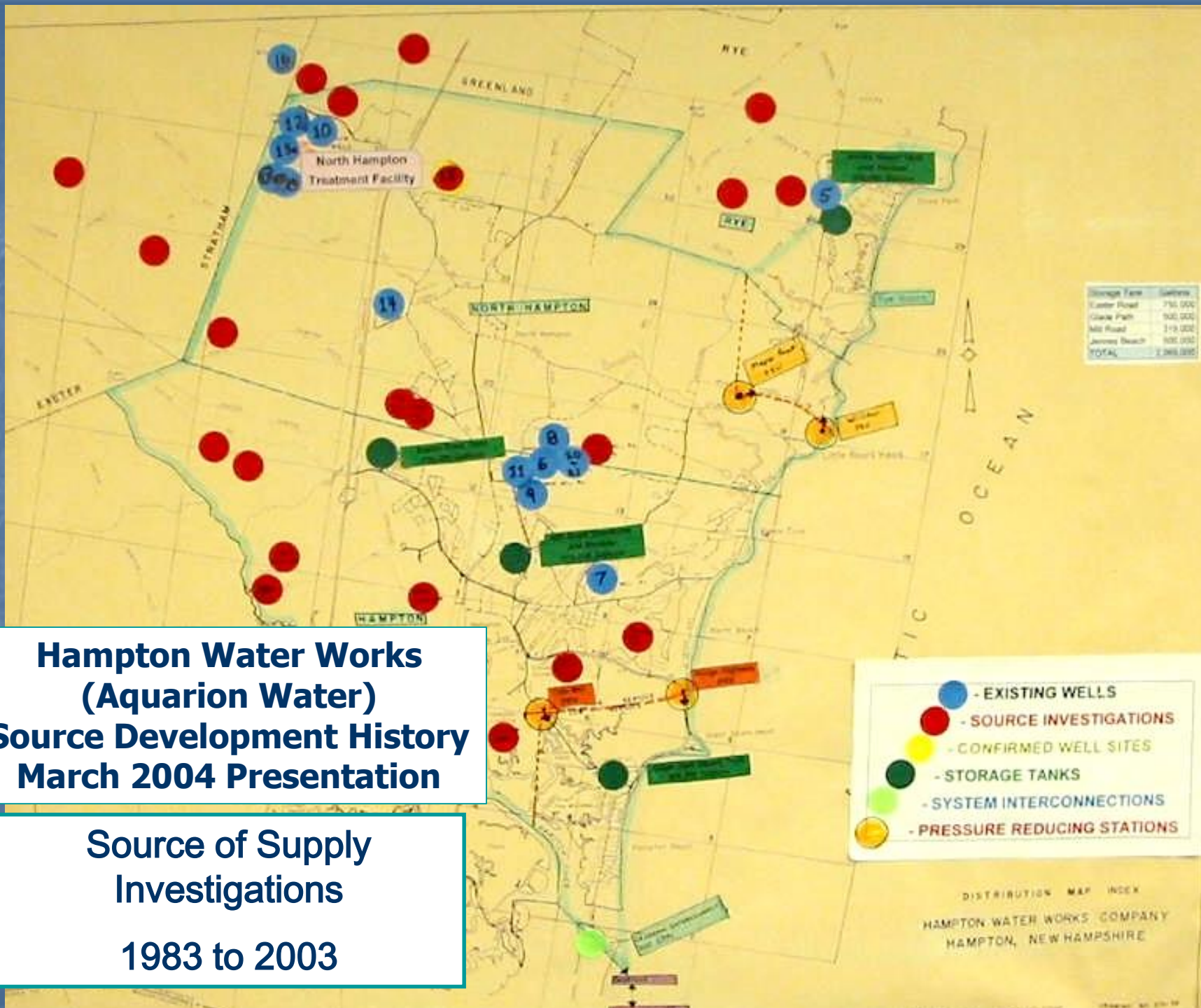
2014 – 2016 Hydrogeologic Study



- A site located on City of Portsmouth conservation land adjacent to Banfield and Ocean Roads was selected, however this was prior to the Coakley Landfill concerns.
- Test drilling has been put on hold and City will work with EGGI to identify other test well sites to proceed.

The next test well site?





**Hampton Water Works
(Aquarion Water)
Source Development History
March 2004 Presentation**

**Source of Supply
Investigations
1983 to 2003**

- - EXISTING WELLS
- - SOURCE INVESTIGATIONS
- - CONFIRMED WELL SITES
- - STORAGE TANKS
- - SYSTEM INTERCONNECTIONS
- - PRESSURE REDUCING STATIONS

DISTRIBUTION MAP INDEX
HAMPTON WATER WORKS COMPANY
HAMPTON, NEW HAMPSHIRE


Water Supply Alternatives

- **Integrated management of system.** For a number of years, the Water Division's staff has implemented an integrated management plan for its water supply. By tracking historic and available supply resources, operations staff are able to adjust sources of supply to optimize sustainability –
 - Maximizing the use of surface water when quantity and quality is good, resting groundwater resources during that period of time and then relying more on the wells when surface water resources are stressed.
 - These efforts helped the water system manage throughout the historic drought during the summer of 2016 even with the loss of the Haven Well.

Water Supply Status Report

- Introduced in 2014
- Monthly Evaluation of Supply
- Public Education of Water Supply Status
- Public Notification of Water Use Restrictions

City of
Portsmouth
Department of Public Works



October 4, 2016

Portsmouth Water Supply Status Report

Overview

The following Portsmouth Water Supply Status Report provides the Portsmouth Water customers an assessment of the current water supply conditions. This report is distributed routinely via the City of Portsmouth's website at:
www.Cityofportsmouth.com/publicworks - water

Odd/Even Water Use Restrictions

Customer Water Restrictions	
N/A	
None	
Voluntary Measures	
Odd/Even Watering	
Two-Days per Week Watering	
No Lawn Watering	<p>Due to current supply and demand conditions, the Mandatory Ban of Lawn Watering that began on September 8th remains in effect. Customers are allowed to hand water vegetable gardens, perennial plants and nursery stock. Golf courses are allowed to water Tees and greens.</p> <p>Water use restrictions are requested at this time due to the continued extreme drought conditions on the Seacoast. As the accompanying information shows, the recent weather conditions continue to be very dry. This has caused extremely low reservoir levels, groundwater levels and stream flow.</p> <p>Compliance with this water use restriction is enforced with two warning notifications and fines of \$100 per violation after that.</p> <p>Additional updates and tips regarding water efficiency can be accessed at the cityofportsmouth.com website or by calling the water/snow ban hotline at: 603-766-7669.</p>

Portsmouth Water Division – Water Supply Update

October 4, 2016

Water Supply Is Really Two Things:

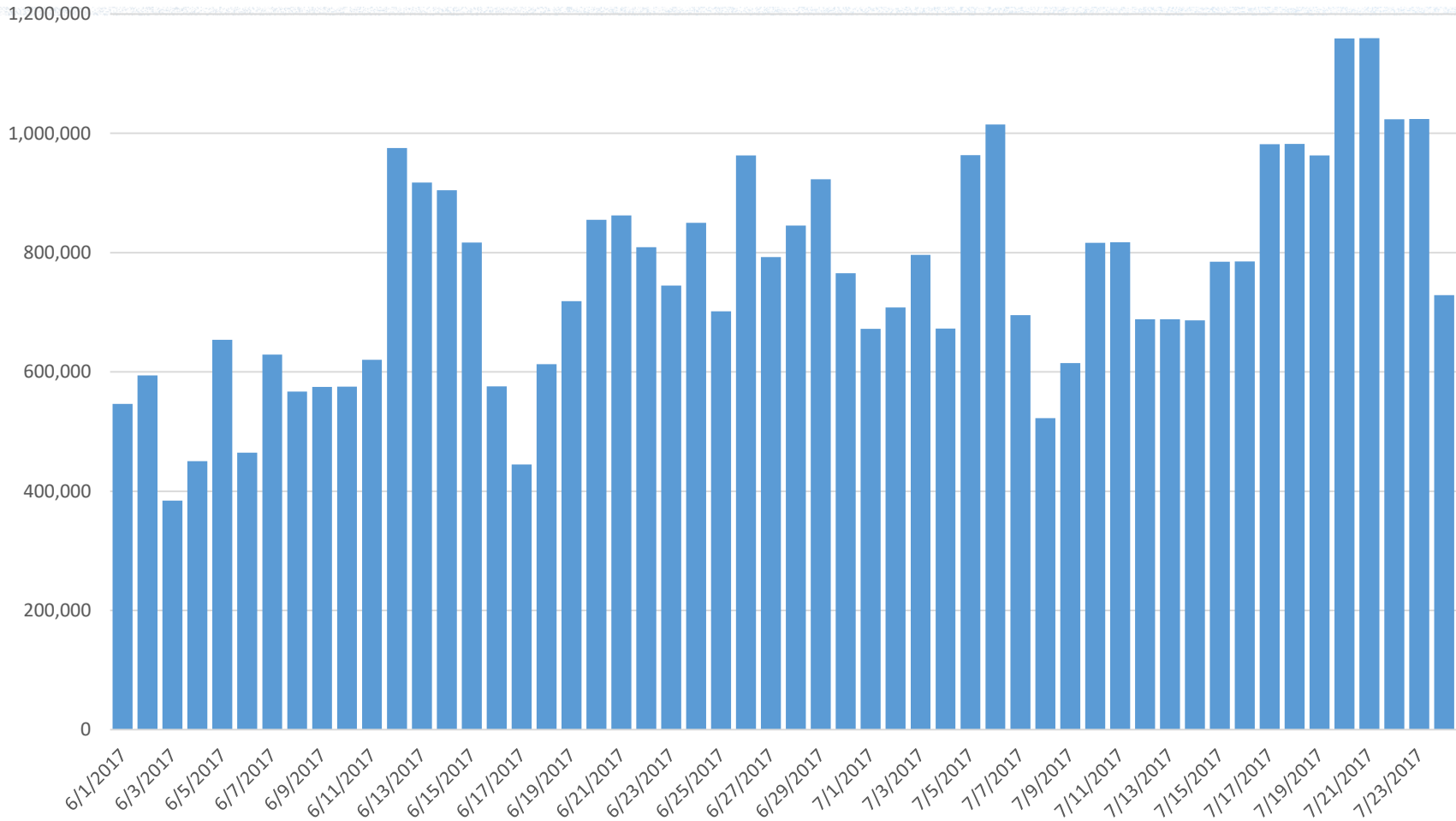
1. Quality
2. Quantity

State Street Saloon Fire – April 9, 2017

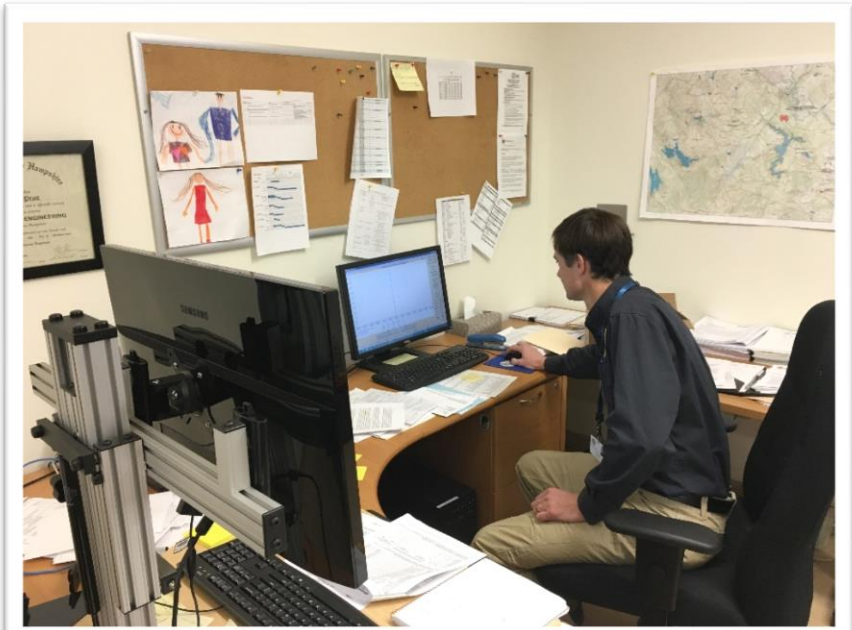
- Pumpage to system
 - (4,200 Gallons per Minute)
- 10,000 Gallons-per-Minute delivered at peak of fire fighting
- 800,000 gallons estimated for duration of fire



Meeting Peak Water Demand Pease Daily Demand – Summer 2017



Portsmouth Water Supply Team...



Pease PFAS Response Team Hydrogeologists... NHDES, AMEC, CBI, City of Portsmouth



Water Supply Alternatives

- **The City continued to implement water efficiency measures throughout 2016.** These measures included:
 - Submitting an **updated Water Conservation Plan** to the New Hampshire Department of Environmental Services pursuant to Env-Wq 2101 “Water Conservation Standards.” This plan will guide the water division’s efforts to continue to improve water efficiency.
 - The City continues with its **Water Efficiency Rebate Program** which allows qualifying residential water and sewer customers a rebate for installing high efficiency toilets and washing machines. The rebates are \$100 for qualifying toilets and \$150 for qualifying washing machines. Portsmouth was the first water system in New Hampshire to offer rebates of this nature. As of April 2017, over 500 toilet and 100 washing machine rebates have been issued. Analysis of customer savings show that this program is saving approximately 25% of the indoor water use.
 - Continue to utilize the services of a **leak detection** firm to survey and identify areas of the water system that may have leaks. Intent is to cover the entire water system every three years. Leaks are now tracked in the City’s Electronic Asset Management Database, where the information is utilized by City staff to assess, justify and schedule capital replacements.
 - **Requiring new irrigation meters to have systems that are EPA *WaterSense* certified.** An additional third inclining block irrigation rate was also implemented in 2016 which provides an economic incentive for water users to be as efficient as possible with irrigation usage.
 - **Implementing water restrictions when necessary and continue to update the public and our water customers about the water supply and demand status.**

Water Efficiency Rebate Program

Water and Sewer Enterprise Fund



Low-Flow Toilets (561 total):

200 rebates issued in 2015

219 rebates issued in 2016

142 rebates through April 2017

High Efficiency Washing Machines (105 total):

71 rebates issued in 2015

16 rebates issued in 2016

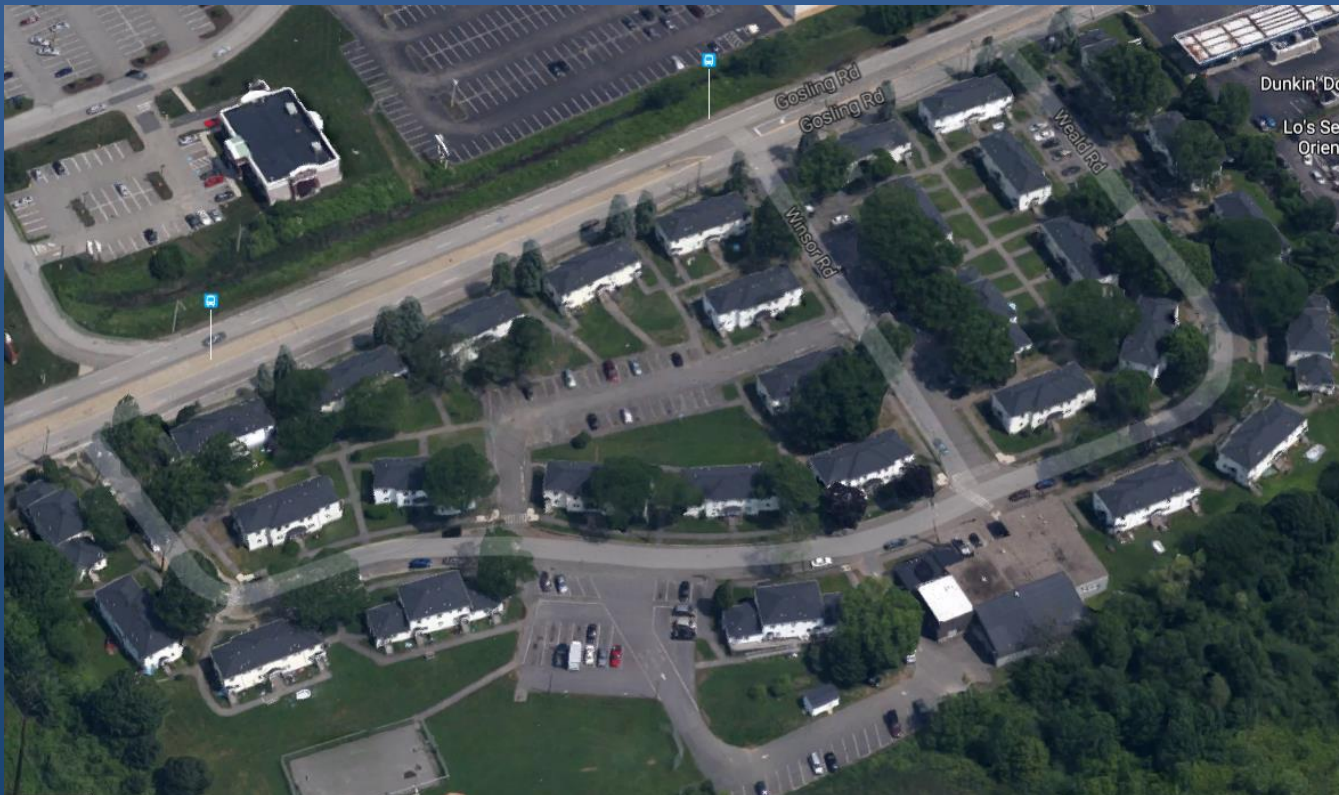
18 rebates through April 2017

Portsmouth Housing Authority Gosling Meadows Retrofit:

- 33 Buildings
- 118 Toilets replaced
- **19% Reduction in water usage**
- 3,119 gallons/day water savings
(As of April 2017)



Portsmouth Housing Authority
Equal Housing Opportunity



RAB Questions Regarding Regional Options

- [What about a] NHDES-mandate for adjacent [Seacoast] water systems to cooperate for the betterment of the State?
- Does Dover Point area have public water [that could be interconnected with Portsmouth]?

Past Regional Water Resource Studies

Southeastern New Hampshire Water Resources Study

APRIL 1982



US Army Corps
of Engineers
New England Division

Regulatory Barriers to Water Supply Regional Cooperation and Conservation in New Hampshire



*A Report to the New Hampshire Legislature
As Required by Chapter 64,
Laws of 2000*

Prepared By:

New Hampshire Department of Environmental Services
&
New Hampshire Public Utilities Commission

August 14, 2001

A Current Assessment of the Water Supply Study

for the
Southern NH Planning
Commission Region



SNHPC

438 Dubuque Street
Manchester, NH

Prepared by
Southern New Hampshire Planning Commission

in association with the
Nashua Regional Planning Commission,
Rockingham Planning Commission and
Strafford Regional Planning Commission.

Prepared in cooperation with the
New Hampshire Department of Environmental Services,
Coastal Program, and Geological Survey

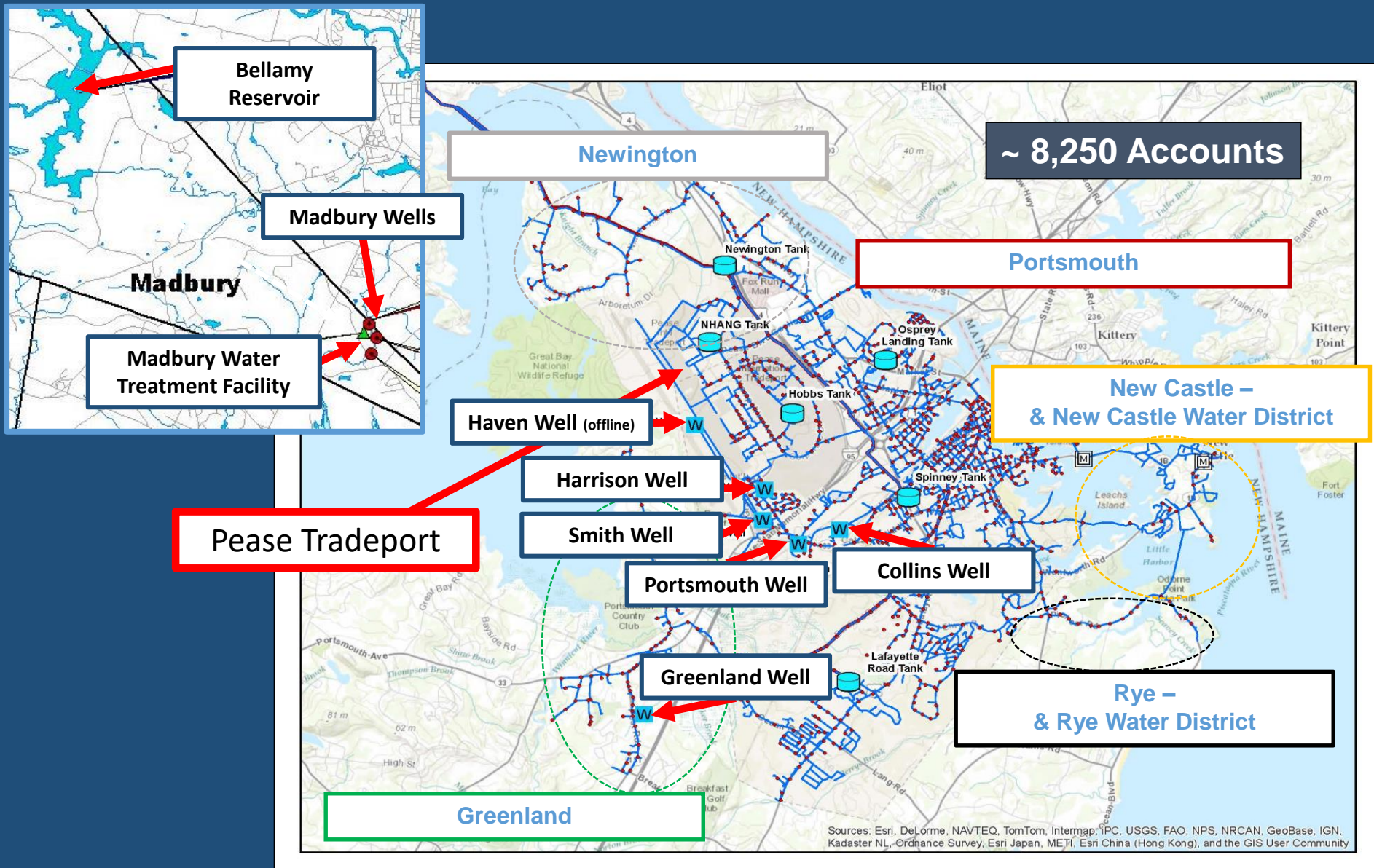
Assessment of Ground-Water Resources in the Seacoast Region of New Hampshire



Scientific Investigations Report 2008-5222

U.S. Department of the Interior
U.S. Geological Survey

Portsmouth Regional Water System



Portsmouth Water System



- Bellamy Reservoir
- Madbury Water Treatment Facility
- 8 Wells (Haven off-line)
- 5 Storage Tanks
- Two Pressure Zones
- 3.5 to 6.5 Million Gallons a Day

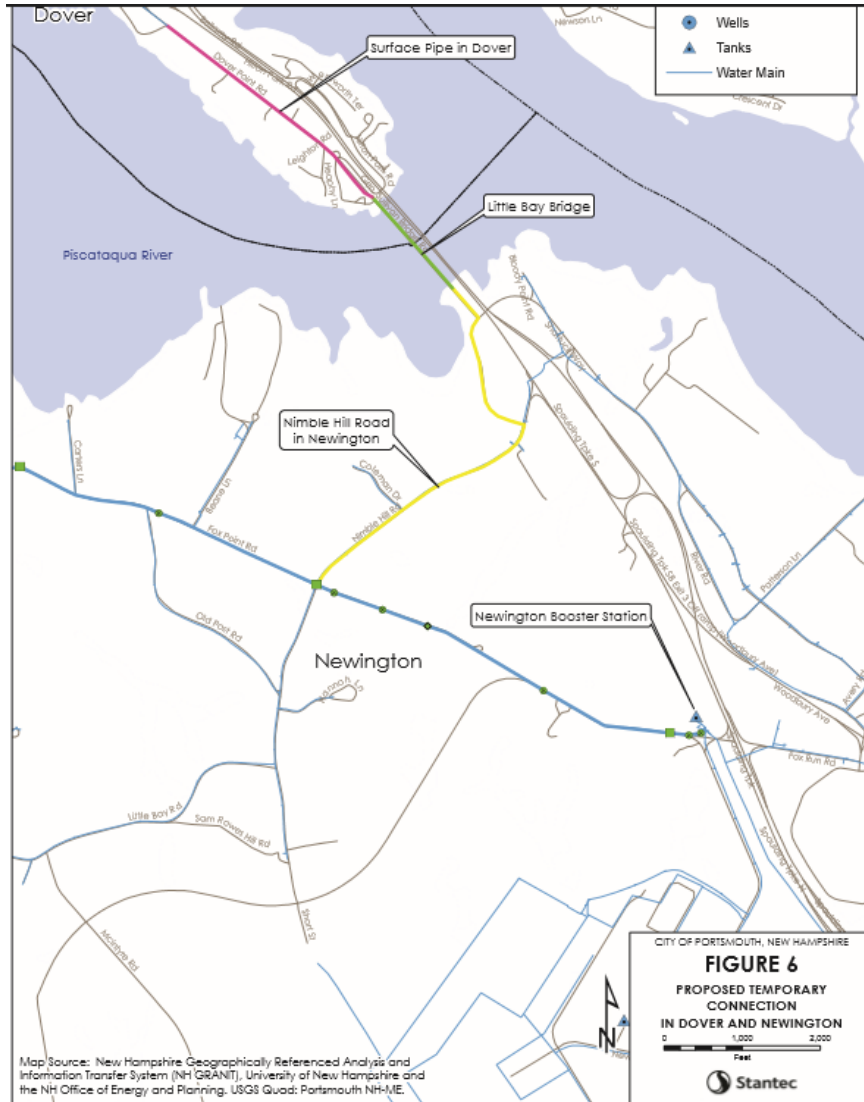
- 189 miles of pipe
- 972 Public Fire Hydrants
- 2,840 Valves
- 8,203 Meters/Customers
- Serve 5 Communities and portions of 3 others



Regional Interconnections

- Seacoast Interconnection Study by NHDES
- Portsmouth is interconnected with Rye Water District – water can be transferred during emergencies
- Portsmouth currently working with Dover on interconnection potential for emergencies (Portsmouth hired consultant in 2015-2016 to perform alternatives analysis)

Dover Interconnection Study



Regional Cooperation - Ongoing and Future

- Southeast Watershed Alliance – Portsmouth is a member community
- Soon to be formed Seacoast Water Quality Study Commission

**Seacoast Regional Water System
Drought Meeting
Madbury, NH
October 5, 2016**

Hampton
(Aquarion)

Portsmouth

Durham

Dover

Rollinsford

Somersworth

Rochester

Rye

Exeter

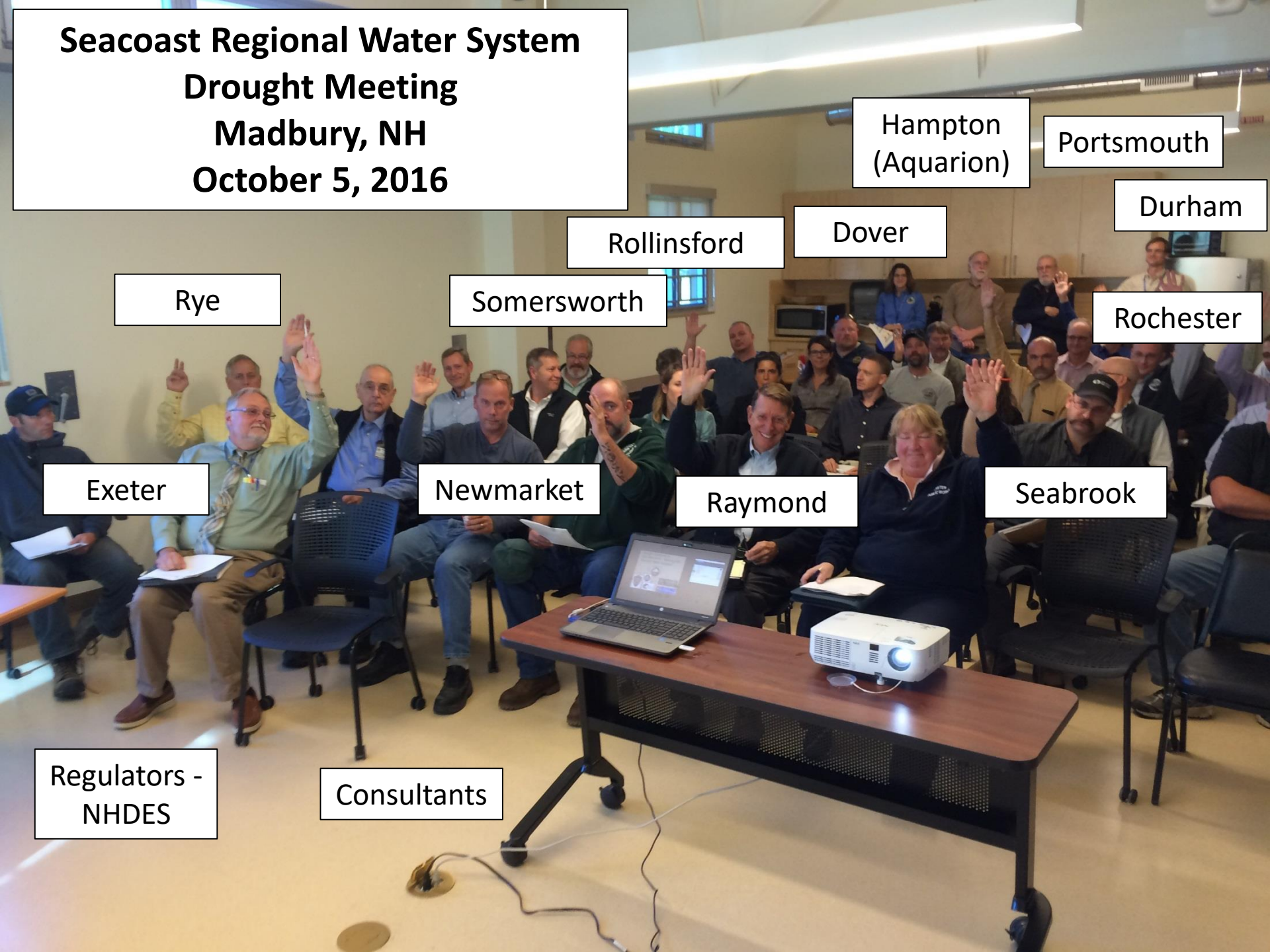
Newmarket

Raymond

Seabrook

Regulators -
NHDES

Consultants



Questions?

