

**Former Pease Air Force Base (AFB)
Restoration Advisory Board (RAB)**

July 26, 2017

6:30-9:00 p.m.

Great Bay Community College
320 Corporate Drive, Room 122 Portsmouth

Meeting Summary

RAB members present: Dr. Courtney Carignan (Portsmouth resident), Susan Chamberlin (Portsmouth resident), Ted Connors (Newington resident), Mike Daly (USEPA), Peter Forbes (Air Force and Department of Defense Co-Chair), Brian Goetz (City of Portsmouth), Scott Hilton (NHDES), Peggy Lamson (Newington resident), Kim McNamara (City of Portsmouth), Christine Miller (Dover resident), Jameson “Jamie” Paine (community member and Community Co-Chair), Gene Schrager (Portsmouth resident), Andy Smith (community member), Maria Stowell (Pease Development Authority).

Meeting support staff present: Ona Ferguson (Consensus Building Institute, RAB Facilitator), Linda Geissinger (AFCEC, Public Affairs), Scott Johnston (Sytsma Group, Air Force Public Affairs support contractor), Rob Singer (AMEC-Foster Wheeler, AFCEC remediation contractor), Mike Quinlan (CB&I, AFCEC remediation contractor)

Others attending: Andrea Amico (Portsmouth resident), Libby Bowen (AMEC-Foster Wheeler, AFCEC remediation contractor), Annette Cooney (Newington resident), Alayna Davis (Dover resident), Kelsey Dumville (EPA), Evelyn Ferland (Newington resident), Erik Ferland (Newington resident), Bruce Ferland (Newington resident), Kerry Holmes (Senator Hassan’s Office), Kyle Hay (Weston and Sampson, City of Portsmouth contractor), Thomas Johnson (Pease Air National Guard), Brad Juneau (SpecPro Services, AFCEC contractor), Dennis Malloy (Greenland resident), Blake Martin (Weston and Sampson, City of Portsmouth contractor), Bruce McElelavrey (Newington resident), Mindi Messmer (State Representative, District 2 - Rye, Cushing and Hampton), Jason Moon (New Hampshire Public Radio), Jesse Pearce (City of Portsmouth), Lulu Pickering (Newington resident), Melissa Paly (Conservation Law Foundation, Portsmouth), Al Pratt (City of Portsmouth), Peter Sandin (NHDES), Liz Wester (Senator Shaheen office), Mark Young (City of Portsmouth),

Next Meeting: Likely in October 2017

Action Items:

- Co-chairs – plan the next RAB meeting agenda.

Welcome, Introductions and RAB Administrative Items

The facilitator welcomed everyone to the Pease Restoration Advisory Board. RAB members approved the March 22 meeting summary as drafted. All RAB meeting materials can be found online at <http://www.afcec.af.mil/Home/BRAC/Pease>

Intro to the CERCLA Process

Mr. Forbes, Air Force, presented an overview of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 process, where the Pease project is in the process, what roles each agency plays in the process and what to expect in the coming months and years (slides 4-6). The Air Force is the lead agency responsible for conducting the program at Pease. The Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NH DES) are regulatory agencies with oversight responsibility to ensure the program is conducted in accordance with federal and state regulations.

The CERCLA process moves through a series of steps to (1) figure out where contamination is located, (2) consider options for addressing the contamination (Feasibility Study), (3) select an approach, (4) conduct the clean up using the agreed-upon approach, and (5) conduct ongoing monitoring until it is no longer needed. Each of these steps requires extensive work. Much of the Pease AFB clean up is either in the clean up phase (4 above) or in the monitoring phase after clean up (5 above). Immediate action may be taken to contain or remove contamination at any time an immediate threat is identified by the process. That is called a removal action and may or may not involve actual removal of contaminants.

There is a lot of interest in where the emerging contaminants, perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) fit in the CERCLA process. Mr. Forbes described how the Air Force was conducting the Preliminary Assessment for PFOS and PFOA when PFOS was detected in the Haven well in 2014 at concentrations greater than the EPA provisional health advisory. The Haven well was immediately shut down, an example of a removal action. The Air Force continued the Preliminary Assessment, completing it in December 2014. The Air Force continued to collect PFOS and PFOA data from monitoring wells across the base to verify the presence of PFAS associated with potential storage or release areas identified by the Preliminary Assessment. Hundreds of investigation monitoring wells and thousands of water samples have been collected to verify the extent of PFAS migration and assess the threat to public drinking water (step 1 above). The groundwater treatment plants that are being constructed to control the migration of PFOS and PFOA toward the Haven well and the drinking water wells in Newington are also examples of removal actions, since they are being taken to address risks to human health before the investigations have been completed or a final remedy selected. The PFOS and PFOA response at Pease is in the investigation phase of the CERCLA process. Investigations take time to plan in coordination with the regulators, collect data, then prepare and review the reports. An investigation of a large complex site can take two or three years.

RAB members shared comments and asked clarifying questions about the CERCLA process, summarized here, with answers provided by Mr. Forbes (unless otherwise indicated) in italics:

- Are there an average number of years a site in on the National Priorities List before it is deleted?
- In a clean up, do sites all become landfills that can't be used again? *To be removed from the National Priorities list (and therefore no longer be a site under CERCLA in need of clean up), the contamination must be gone and the property must be available for unrestricted use. A groundwater use restriction prohibits using groundwater within the site boundary for drinking water purposes and is the most common use restriction at Pease. Once the groundwater is cleaned up to this standard, the use restriction may be removed. At this time, 51 of the 83 sites at Pease are at that final stage of completion. Properties can still be enjoyed as long as the usage is within the constraints of the use restrictions. Even properties with landfills can be beneficial to the owner; for example, some are used to site power generation equipment.*
- Will there be a PFC-specific Record of Decision? *The Air Force will continue to investigate PFOS and PFOA in accordance with the CERCLA process to completion.*
- After a site is considered cleaned up, do you continue to test for emerging contaminants? *Whenever a new emerging contaminant is identified, the Air Force initiates the same CERCLA response that has proven effective for previous clean-ups.*
- Is the remedial design that you are talking about the water treatment design that is going into place, or are there other activities that are separate from the public water supply that you will be carrying out to cleanup the aquifer? *These two treatment systems are not connected to the public water supply system. The Air Force is designing a treatment plant and the associated extraction wells to control the migration of PFOS and PFOA into Newington and another treatment plant to control the migration of water toward the Haven well. [This is referred to as a removal action.] If we find at the end of the remedial investigation [step 1 above] that there are other actions that can be done to bring this along quicker, then we would evaluate the feasibility of those options.*
- So the public will have input into the feasibility, and the remedial design under development right now was to an immediate removal action? *Yes.*
- Where is the site in that process? *We have done a preliminary assessment and site inspections to collect data and understand the sites better. (Mr. Daly answered) The data collected will fast track remedial investigation work. We are not starting from ground zero, and we should be able to focus the remedial investigations much better with the data being collected.*
- When will there be answers to questions about risk to human health from using the water in Newington for sprinklers or swimming? *We do not know how quickly we will be able to answer those questions, as the answers require more information about these compounds than anyone has right now. (Mr. Hilton answered:) Some of those questions will be answered in the remedial investigation. It's a very comprehensive investigation and it includes a risk assessment on each pathway to determine if there is a risk.*

Portsmouth Drinking Water Treatment System Update

Scott Hilton, NHDES, addressed community and RAB member questions since the last RAB meeting by giving an overview of reasons why available water sources are limited and what other options cities might have.

Brian Goetz, Deputy Director of Portsmouth Public Works, responded in detail to questions submitted prior to the meeting by RAB members with a presentation on the Portsmouth water treatment system and related questions (see Attachment 2). His presentation addressed system specifications, treatment progress, Harrison/Smith Well filter performance, and what to expect from the system in the future.

RAB members asked questions and shared comments, summarized here, with answers provided by Mr. Goetz in italics (unless otherwise indicated):

- It seems like there are alternative drinking water sources other than the existing source that is contaminated with PFCs. Community members would like the City to tap into other known drinking water resources, the Air Force to remediate the groundwater at Pease, and then the City to come back to the Haven well again only when PFCs are better understood, the contamination has been addressed and the process is trusted. *We will do everything we can to work with the Air Force and the regulators to identify any contaminants coming from the source and to determine the parameters, procedures and scheduling the monitoring of the water before and after treatment.*
- What is the process to request that certain kinds of testing occur at Pease? *(Mr. Forbes answered) The Air Force is generally receptive to studies and learning more information.*
- Is there anything we can do to shore up the confidence in current water protection efforts and in the water coming out of treatment, possibly with scientific support?
- Community members are afraid that we are using a contaminated source of drinking water when we could go elsewhere for an alternate source of clean water.
- We should proceed with caution. There may be many classes of PFCs, and we may be monitoring for only a small number of them. We are learning a lot rapidly, with more to learn, so we should assume we might not yet understand the full extent of contamination or suite of contaminants.
- Can you say more about the resin pilot study? *Vendors and researchers are developing several resin materials that can be used to filter contaminants from water. The resin in the Pease pilot study has been designed to trap specific PFAS compounds. We are not aware of many public drinking water systems doing PFOS removal with resin at this time. There is a pilot study of resins ongoing here at Pease as we speak. We don't have data yet, but we should have that information to share in the near future.*
- A RAB member requested a presentation in Newington in the next few weeks to explain to the residents with private wells about the contamination, the current investigation, and what people can do to address contamination.

Air Force Restoration Activities Update

Mike Quinlan, APTIM (CB&I is now APTIM) provided an update on Site 39, the former Pan Am Hangar where aircraft maintenance activities including degreasing and paint stripping caused PCE and TCE contamination in the soil and groundwater. He described methods in place to remove the contamination (See attached slides, labeled Site 39).

Peter Forbes, AFCEC, Mike Quinlan and Rob Singer, AMEC-Foster Wheeler and AFCEC remediation contractor, presented an update on the PFC cleanup program in place at Pease that focuses on groundwater. This included an update on the Site 8 (Fire Training Area) and the Airfield Interim Mitigation System (AIMS). The Site 8 system will use a reusable resin technology that will result in very little waste material requiring disposal (incineration). The AIMS will use granular activated carbon, similar to the City's treatment system.

Public Comments

Members of the public were provided the opportunity to share thoughts with the RAB. Four people had comments to share, summarized here.

Lulu Pickering

I'm from Newington and I live on one of the farms. Our spring has contamination levels of 4500 parts per trillion, which may be some of the most extensive contamination that has come off the Air Force Base. I'm concerned that the map on slide 10 in the presentation doesn't show the biggest plumes of pollution coming from Site 8. Private landowners and property in Newington have been really impacted by the PFCs, and it should be included on the maps. There are three different watersheds that impact Newington. There's data on Pickering and Knights Brook, but what's going on with Peverly Pond? None of that has been indicated.

One of the biggest problems is the monitoring system is designed but likely is not testing for all the 40 different classes of PFCs we are hearing about. This makes it hard to trust data and results that indicate the water is clean. I love what you're trying to do to clean up the water, and I really want the water to be clean, but I don't trust that we're going to accomplish it. I don't hear you saying you are looking at current activities on the Air Force Base. Could the Air National Guard and private businesses be adding more of these same chemicals on to the runway today? Is this being monitored? Is it possible they might be making this problem worse? Are the landfills in Newington being tested and monitored for possible seepage?

Finally, in considering other water sources, could we consider sources in Maine, or is there a reason we are precluded from that?

Mindi Messmer

I have many big concerns and questions including:

- Has the Air Force done a search on the historic use of the foams? Is there a way we can connect the dots between what the military used with the foams and the types of compounds we might be finding in the water?

- Has there been extensive enough sampling to know if the water contamination is being appropriately addressed by the filtration system?
- Are the water samples taken by the Conservation Law Foundation at the tributaries and brooks leading away from the base being looked at to characterize both PFCs and all of the foam-related compounds that have historically come into those brooks?
- Why isn't the project looking at contamination of Great Bay shellfish yet? We have an active shell fishing industry there, and water from this area empties into Great Bay.
- There is a need to address risks to the public through shell fishing and direct contact with the water. Is there a plan in place to notify the public about the possible risks of contacting contaminated water? We only know the PFOA and PFOS numbers in some brooks and Peverly Pond. A big Peverly Pond biota study could be used to assess PFC issues. I am deeply concerned about the fish in those ponds, which accumulate PFCs.
- Yesterday's results from Coakley Landfill show very high levels of contaminated sediment in the brooks, which is very concerning. High levels of PFCs around Site 39 are also a concern. Has anyone tested the vapor at Site 39 for PFCs?

Andrea Amico

- How are contaminants added to the CERCLA law? PFCs are not currently under CERCLA, which is why the Air Force has stated that they can't fund a health study at Pease.
- At what point is the Haven well no longer considered a valuable resource given its extensive history of contamination and location near a runway at an active airport? At what point do we prioritize public health over that water resource?
- What levels will trigger the GAC cartridges to be changed at Pease?
- The community cares about all the PFCs that are in the water, not just PFOS and PFOA. We care about short chain, long chain, all of them, and we don't want any of them in our drinking water.
- What are the PFC levels in the Greenland, Madbury and Dover wells?
- What is the status of wildlife testing in the area? What wildlife may be impacted surrounding Pease? If that testing hasn't been done yet, when can we expect it?
- In January I asked if there is old water that can be tested on Pease. Is there anything at Pease that would give us this historical data?
- We are concerned that there are chemicals we could be missing, that are getting through the GAC. Will the Air Force consider conducting testing to look for those other classes of chemicals referenced in the article?
- Who is monitoring surface water at Pease for PFAS chemicals and where can the community find that data? *Mr. Goetz answered that the water quality report includes PFAS levels for the wells and can be found on the City of Portsmouth website.*

Alayna Davis

- The July 21 Air Force press release mentioned that the Air Force recently completed work on base-wide site inspections to confirm historic PFAS releases. Where is that report? Can we get copies of it? Will the findings be presented to the public?

- There's an article about a site in Colorado with issues similar to those at Pease where they are not able to remove PFHxS. Brian, have you reached out to learn from them? *Mr. Goetz answered that the article actually says that it is unclear if the filters would remove PFHxS. This highlights the need to perform demonstration tests with specific filters and water from the site for the most accurate determination.*
- How many GAC filters will be needed at the Haven well to get the well back online? *Mr. Goetz answered there are eight filters total, four sets of two. This design includes redundancy to make it possible to have one set of filters out of service for maintenance or other reasons while the system keeps working. Pease water demands fluctuate, so some days only two filters are needed, other days six.*
- Why are ion exchange resin filters being used for Site 8, when such filters weren't part of the airfield mitigation treatment process design? *Mr. Singer responded that a cost benefit analysis showed that ion exchange resin and carbon filters are each appropriate under different conditions (considering cost). It is less expensive to use renewable ion exchange resin filter media for the Site 8 treatment system due to the higher concentration of PFOS in the water. Concentrations of PFOS at the airfield mitigation system are lower, and carbon filters can go longer there before changeout is required.*
- Mr. Quinlan mentioned there are a couple areas under the Hangar 227 floor where TCE and PCE levels were above standards. What actions are then required?

Attachment 1: SLIDES

Attachment 2: SLIDES

Air Force Civil Engineer Center



Pease AFB RAB Meeting

26 July 2017



Agenda

- **Welcome and Introduction**
- **RAB Member Administrative Items**
 - March 22 2017 minutes approval
- **Intro to the CERCLA Process**
- **Pease Tradeport Water Supply Update**
- **Current Restoration Activities Update**
- **Public Comments**
- **Meeting Recap, Next Steps, Upcoming Meeting Dates**
- **Adjourn**



RAB Member Administrative Items

- **Approve Summary From 22 March 2017
RAB Meeting**

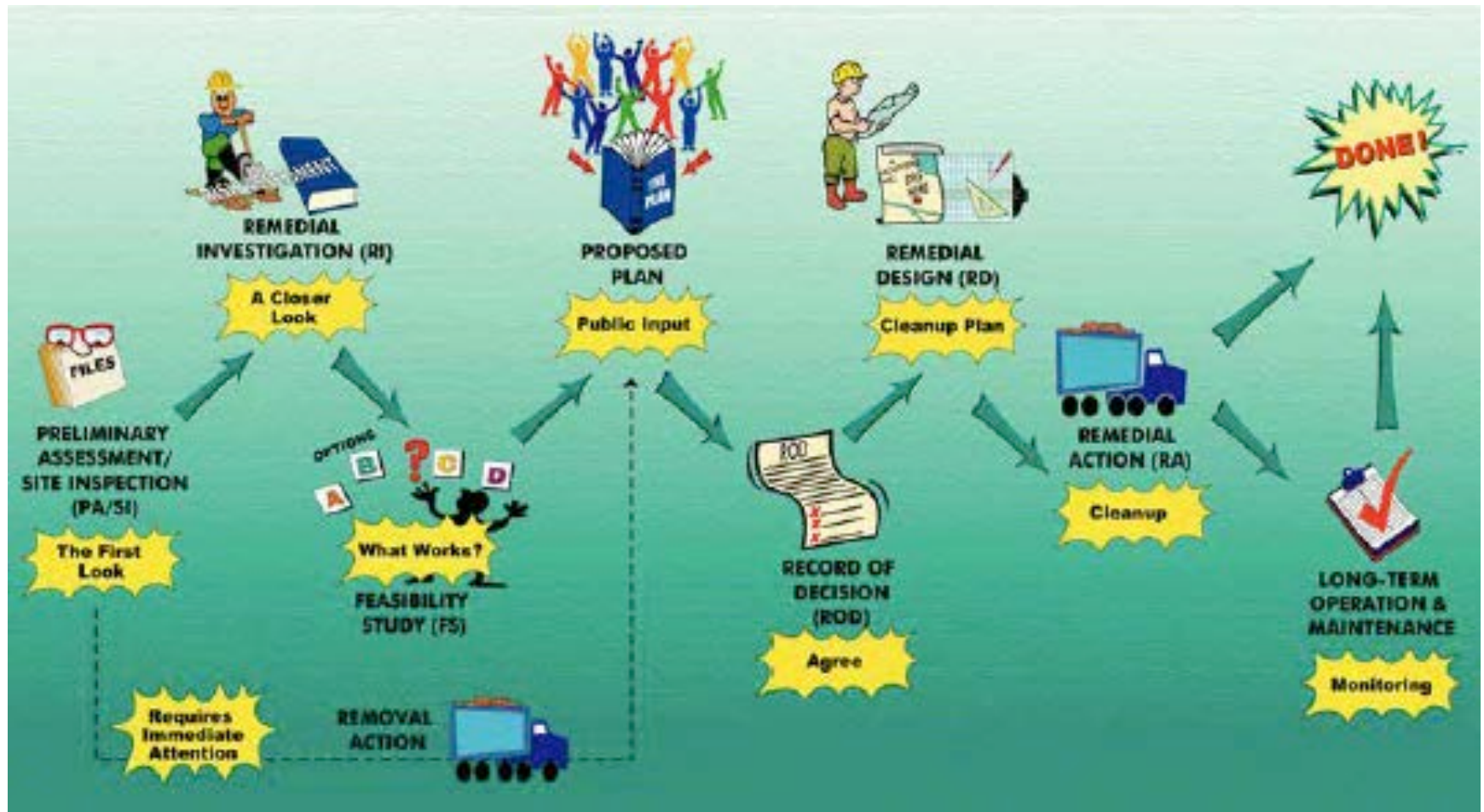


The CERCLA Process

- **The CERCLA process**
- **Roles**
- **Site Scorecard**
- **What to expect in the coming months**



CERCLA Process





Roles

- **AF – directs the program, remediates water**
- **EPA – develops federal standards, oversight**
- **NH DES – develops state standards, oversight**
- **Public – provides local community perspective**



Pease Tradeport Water Supply Update

- **Portsmouth Drinking Water Treatment System Update** – City of Portsmouth representative



Scorecard/Progress

- **83 IRP Sites**
 - **51 Sites closed (cleanup finished, unrestricted use)**
- **Of the remaining 32 sites**
 - **11 have completed all cleanup activities**
 - **21 have active cleanup ongoing, including**
 - Groundwater treatment
 - Permeable Reactive Barrier
 - Monitored Natural Attenuation
 - Long-Term Monitoring

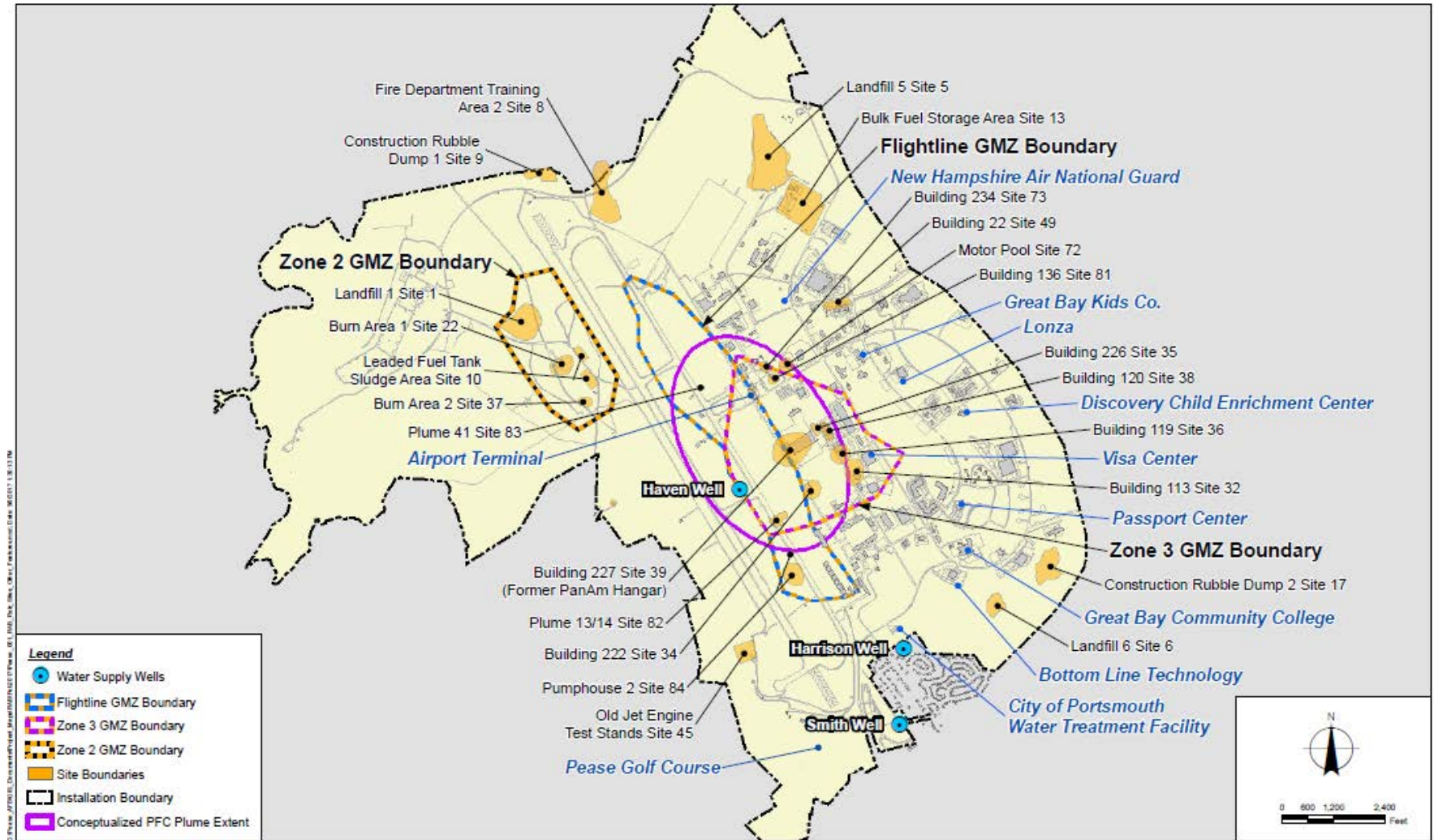


Air Force Restoration Program

- Site 39 Update – Former Pan Am Hangar
– *Mike Quinlan*
- Site 8 (Fire Training Area) Groundwater Treatment System
 - *Rob Singer*
- Airfield Interim Mitigation System (AIMS) Groundwater Treatment System
 - *Rob Singer*



Sites Map





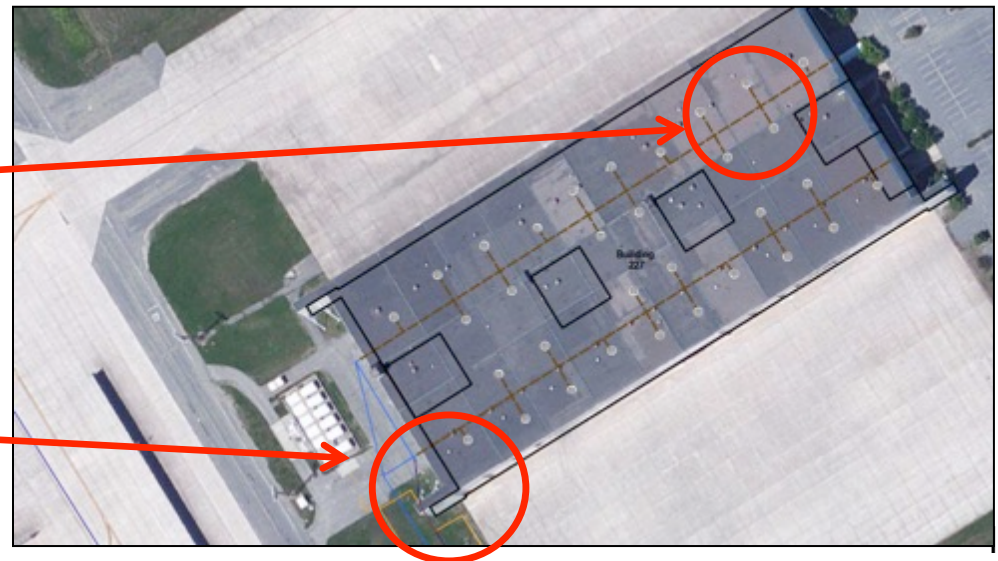
Site 39- Bldg 227 Hangar

- Largest Hangar at Pease
 - Constructed in 1956
 - 600ft L x 250ft W x 60ft H
- Aircraft Maintenance facility
 - Degreasing
 - Paint stripping
 - Aircraft repairs
 - Wash down of aircraft



Areas of Concern

- Former Wash Rack & HWSA in NE corner
- Floor drains/Sewer-Industrial waste lines – SW Corner





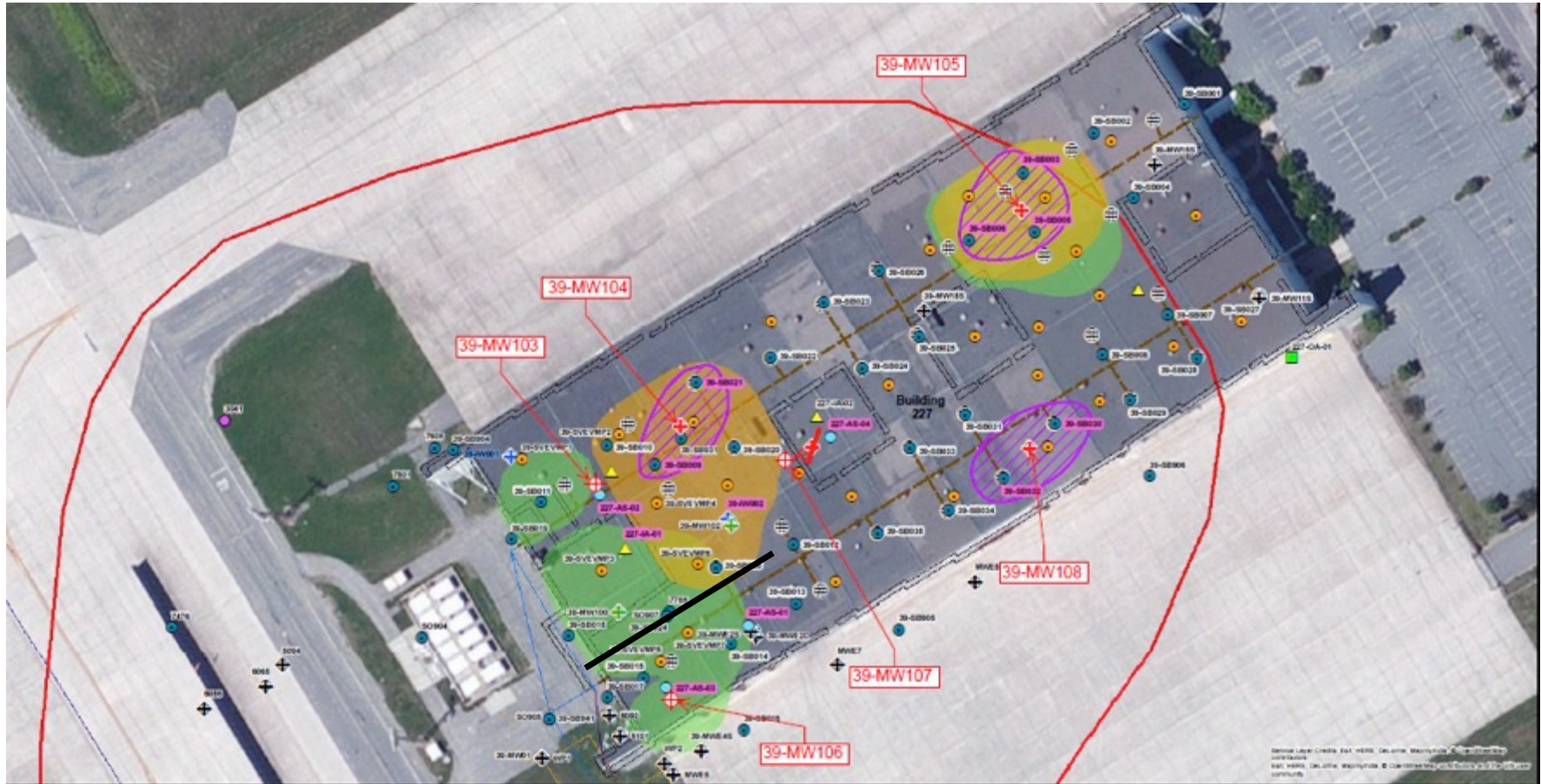
Site 39 - Bldg 227 Hangar

- Current Use – Storage of plow equipment for airfield snow removal





Site 39 - New Wells Installations

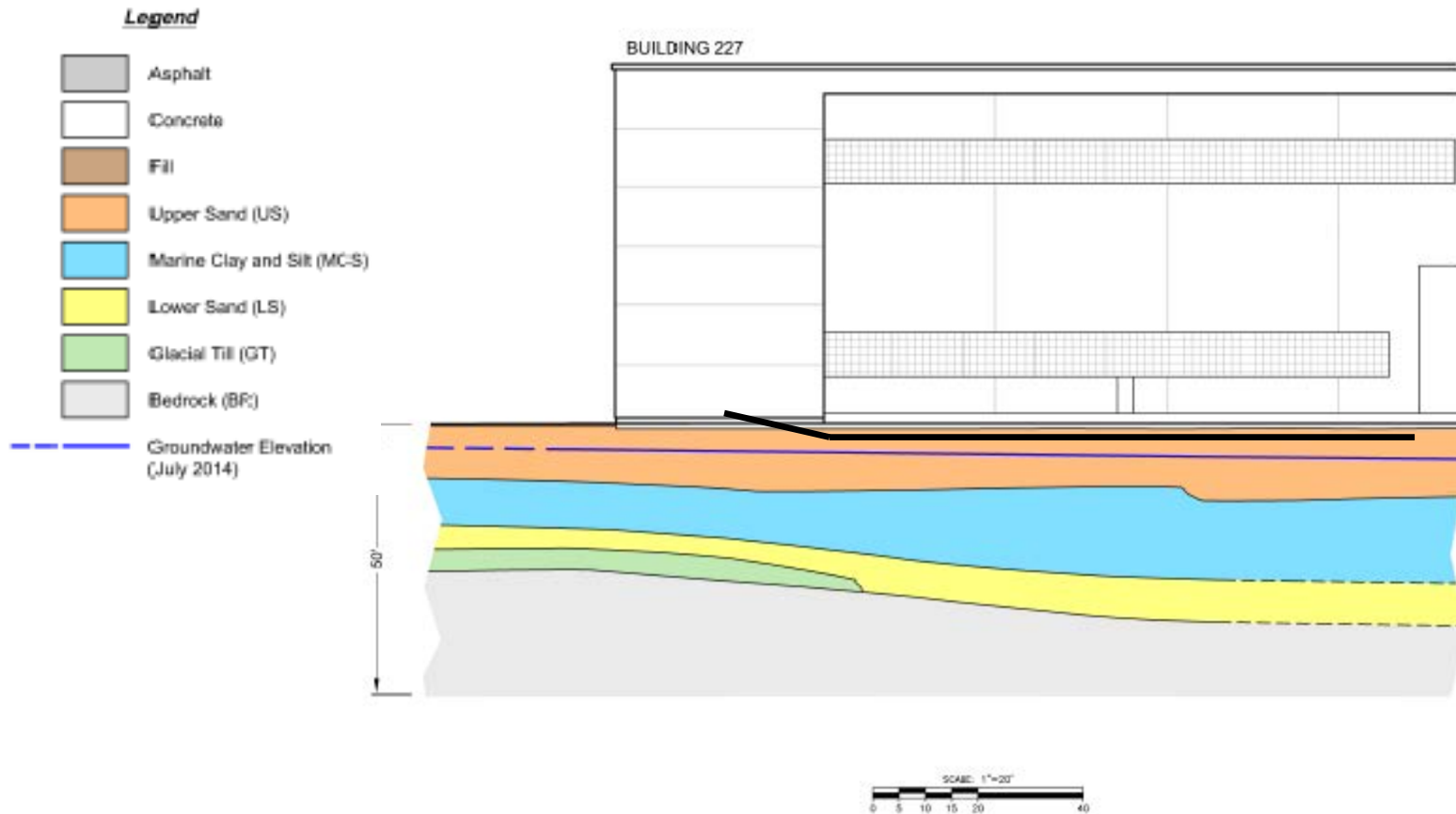


-  New Shallow GW Wells  Proposed SVE Well  New Subslab Vapor Wells





Site 39- SVE Well Installation





Site 39 – SVE Well Installation



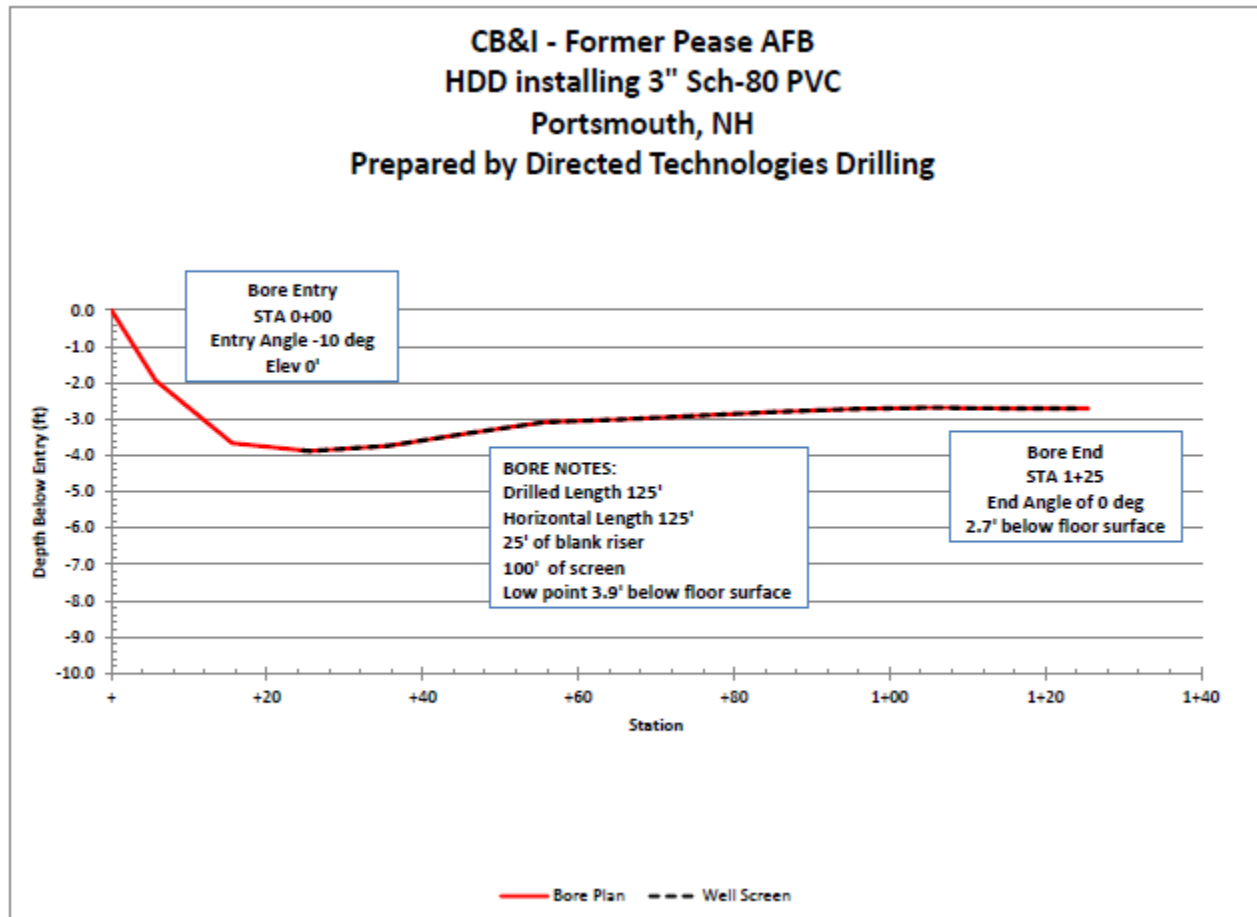


Site 39 – SVE Well Installation





Site 39 – SVE Well Installation





Site 39 – Roof Drain Issue





Site 39 - Summary

- SVE Well Installed (March 2017)
- Additional Soil and Groundwater Investigation Conducted (March 2017)
- Subslab soil vapor sampling (completed July 6)
- Planned Activities / estimated schedule
 - SVE Operation – August - September 2017
 - Further delineate shallow groundwater contamination under bldg. – Fall 2017
 - Shallow Groundwater Treatment – Spring 2018



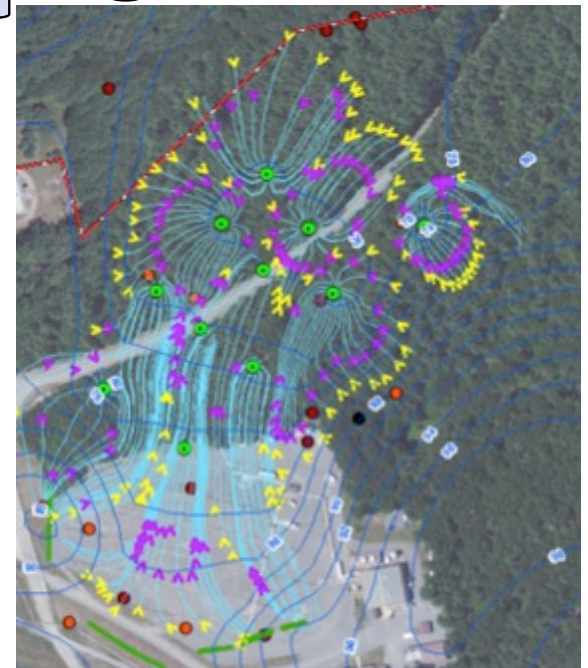
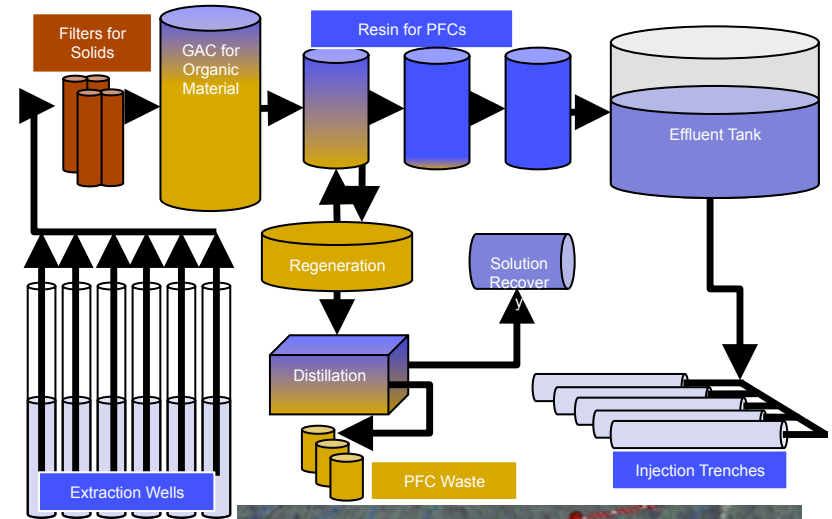
Site 8 Interim Mitigation System Update

- **System Facts**

- Design Flow: 200 gallons per minute
- Number of extraction wells: 10
- Treatment process: Particle filters, granular activated carbon, sorbent media, in place regeneration of media

- **Status**

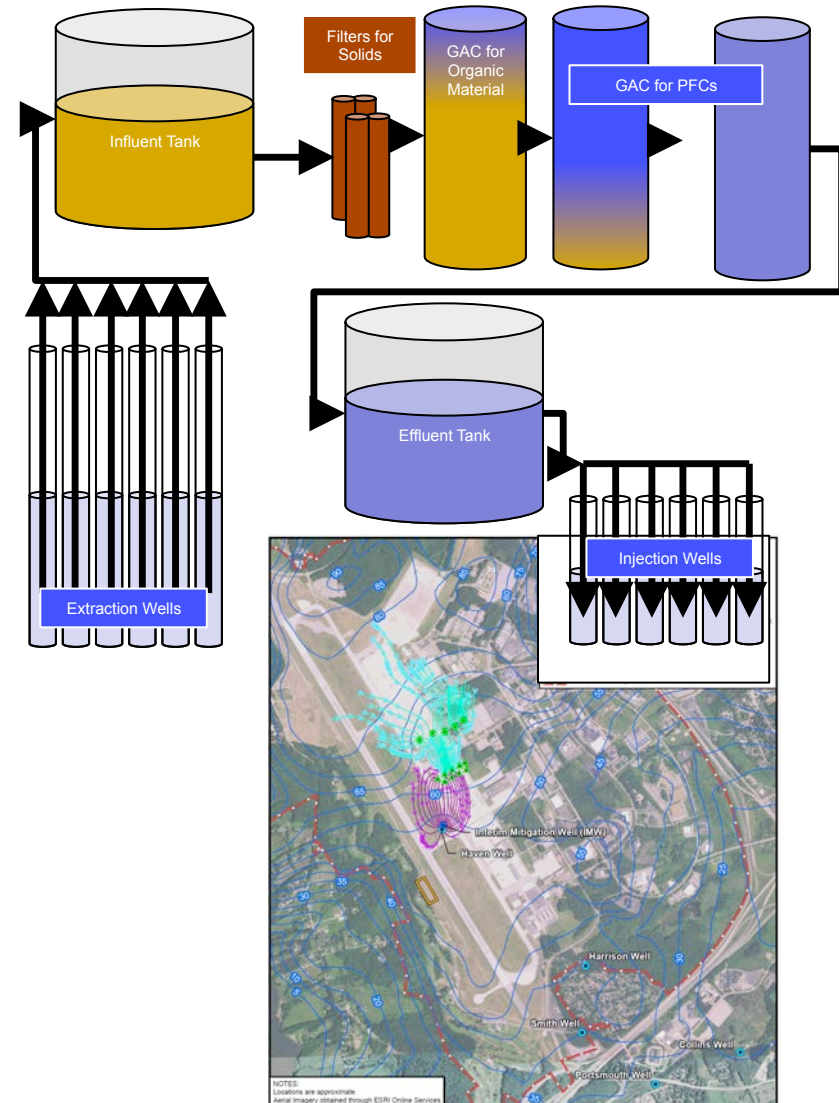
- Air Force contractor is mobilizing to the site for construction this week
- Well drilling will commence on August 7, 2017
- Construction will be substantially complete by end of the year
- Startup in January





Airfield Interim Mitigation System Update

- **System Facts**
 - Design Flow: 700 gallons per minute
 - Number of extraction wells: 6
 - Treatment process: Particle filters, granular activated carbon
- **Status**
 - Air Force is in the process of contracting construction
 - Treated water reinjection testing is scheduled for August through October
 - Air Force anticipates contract award this fall





Update on PFCs at Pease

- **Air Force has continued to sample the Smith, Harrison, Portsmouth, and Collins Wells**
 - 121 sampling events and 830 samples (supply wells, sentry wells, and distribution points)
 - Concentrations are very stable – no changes
 - Data posted to City website
 - Sentry Monitoring performed in May 2017, 7th event since October 2014 - no changes
- **2017 Planned Activities:**
 - Test the groundwater injection field
 - Construct interim mitigation systems
 - Continue sentry well monitoring
 - Continued to develop a better understanding of PFOS and PFOA distribution at Pease



RAB Discussion

Questions?



Public Comment

Goal: Provide opportunity for members of the public to comment.

Process: Public members fill out a comment card indicating they wish to speak. Statements are timed and are limited to 3 minutes for each speaker. The timer will notify the speaker when they have 30 seconds remaining and when they have reached 3 minutes.

Outcome: Questions will be answered in writing in Meeting Minutes and individually, if you leave us an email address



RAB Recap

- **Meeting Recap**
- **Next Steps**
- **Upcoming Meeting Dates**



Adjournment





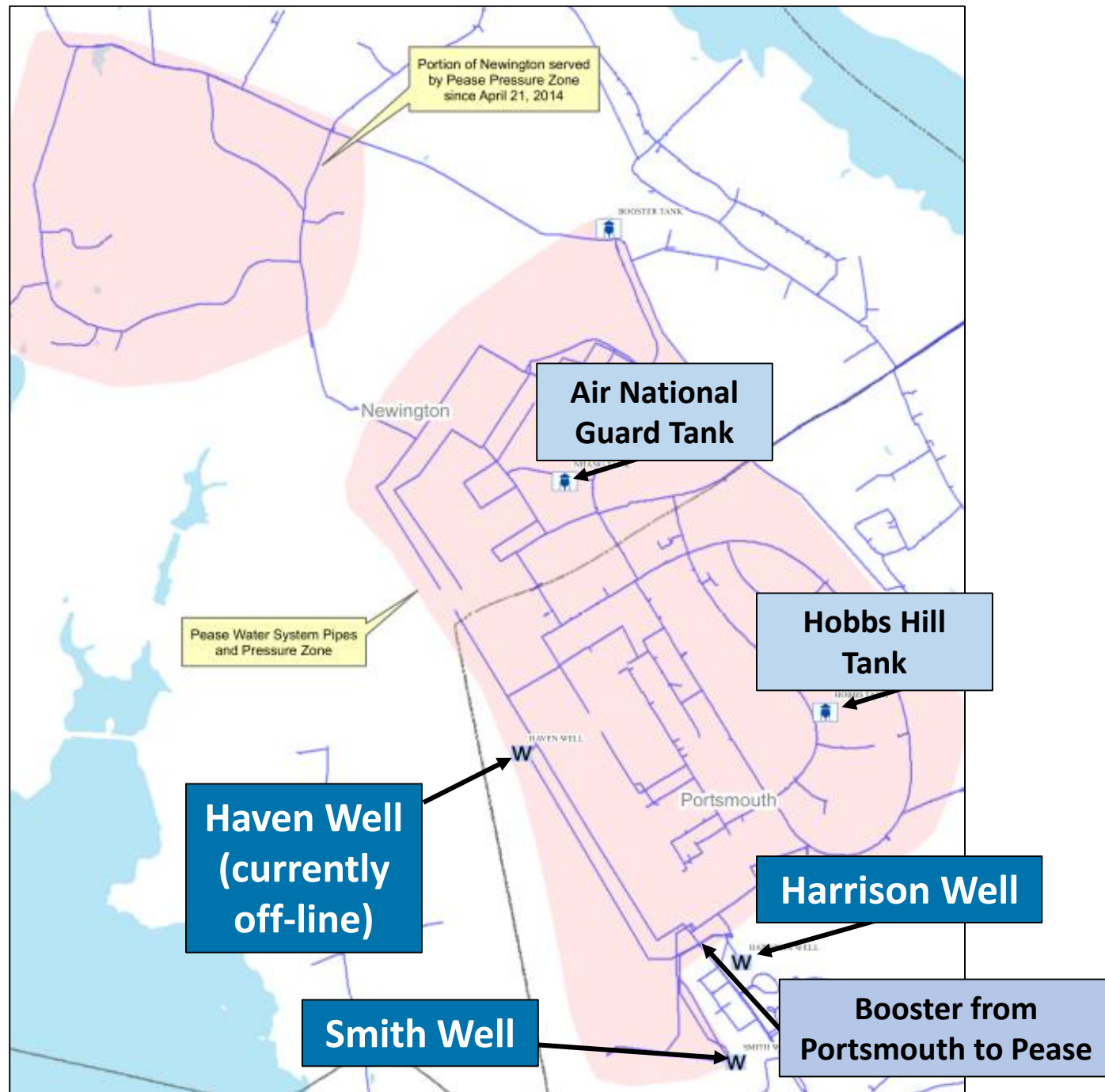
Pease Tradeport Water System: Drinking Water Treatment System Update

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)

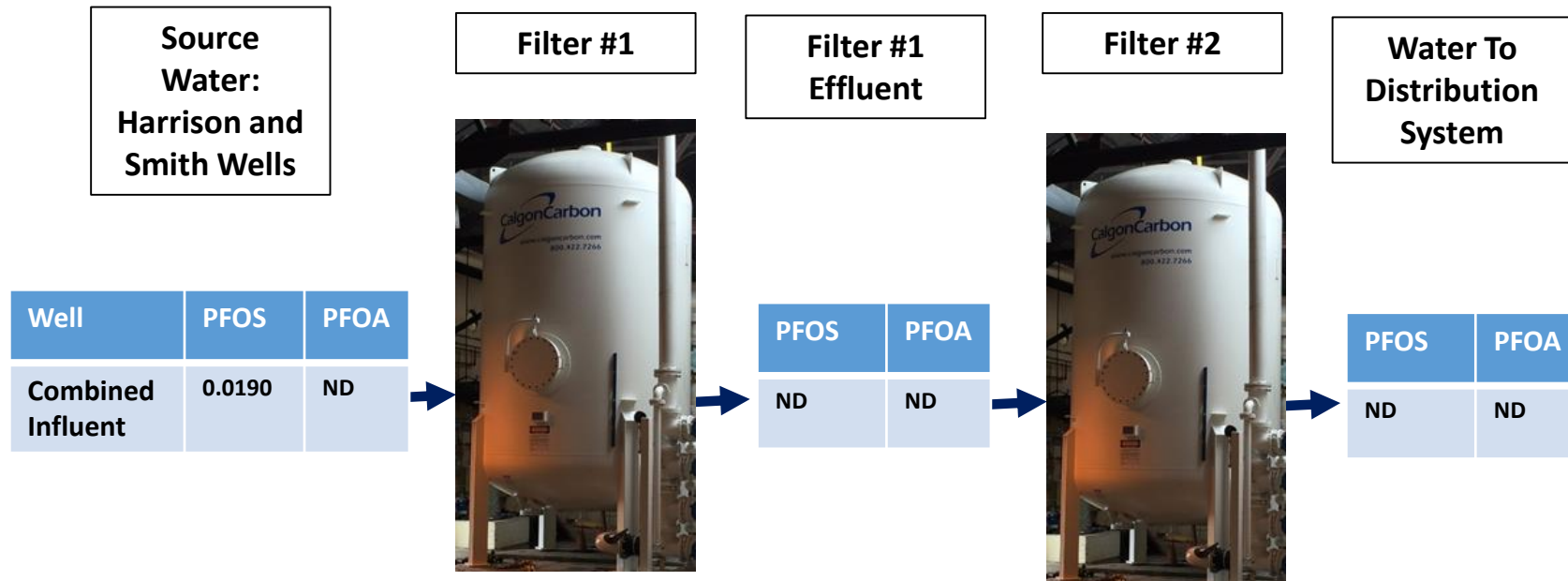
Air Force Agreements to Address the Loss of the Haven Well

- 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

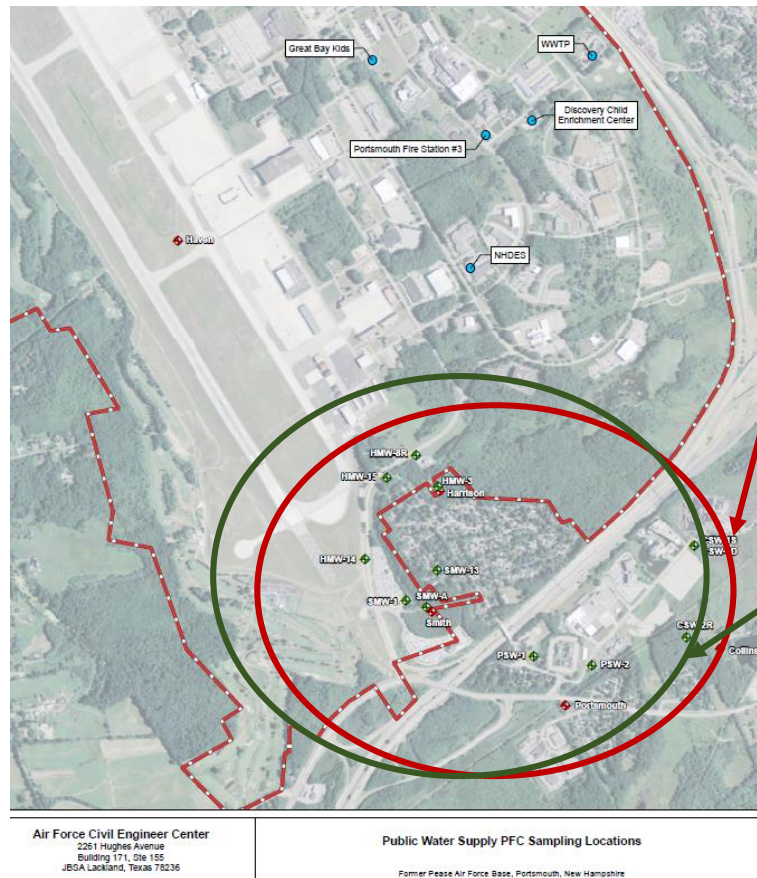
Sample Results – Uploaded to City Website (Testing includes Raw/Well Water Going into Filters)

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

Sample Location	Sample ID	Collection Date	6:2 Fluorobutyl sulfonate (6:2 FTS)	8:2 Fluorobutyl sulfonate (8:2 FTS)	N-Ethyl perfluorooctane sulfonamide (EFOSA)	N-Ethyl perfluorooctane sulfonamide (EFOSA)	N-Methyl perfluorooctane sulfonamide (MEFOA)	N-Methyl perfluorooctane sulfonamide (MEFOA)	Perfluorobutanesulfonic acid (PFBS)	Perfluorobutanoic acid (PFBA)	Perfluorodecane sulfonate (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDDA)	Perfluorooctane sulfonate (PFOS)	Perfluorooctanoic acid (PFHpA)	Perfluorooctanesulfonic acid (PFHxS)	Perfluorooctanoic acid (PFHxA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorooctane sulfonamide (PFOSA)	Perfluorooctanesulfonic acid (PFOS)	Perfluoropentanoic acid (PFPeA)	Perfluorotetradecanoic acid (PFTrDA)	Perfluorotridecanoic acid (PFTrDA)	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
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	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
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

- 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



Department of Public Works
Portsmouth, New Hampshire

Department of Public Works, 680 Peverly Hill Rd, Portsmouth, NH 03801 Phone: (603) 427-1530, Fax: (603) 427-1539 | Contact

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	0.0096	ND

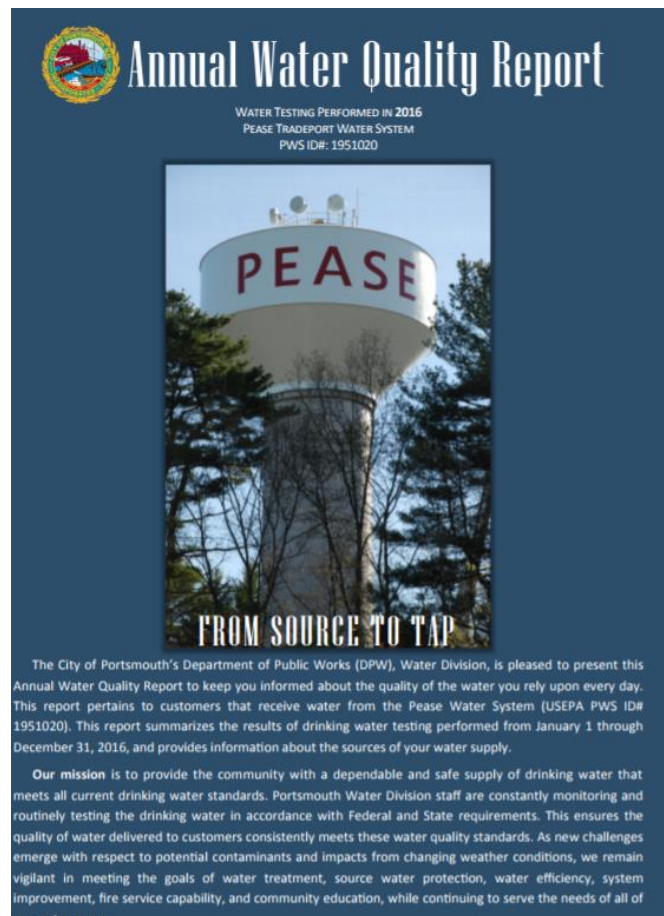
Filter	PFOS	PFOA
Filter #1	ND	ND
Filter #1 Effluent	ND	ND
Filter #2	ND	ND

Water To Distribution System	PFOS	PFOA
	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



PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are currently unregulated by the Safe Drinking Water Act (SDWA); however, the USEPA Health Advisory concentration is 70 parts per trillion (ppt) for perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Studies indicate that exposure to PFOA and PFOS over certain levels may result in adverse health effects, including developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations), cancer (e.g., testicular, kidney), liver effects (e.g., tissue damage), immune effects (e.g., antibody production and immunity), thyroid effects (e.g., other effects (e.g., cholesterol changes).

In response to the discovery of PFAS in the Haven Well in May 2014 at levels exceeding the EPA Provisional Health Advisory level (200 ppt at that time), the Haven Well was removed from service. This well has remained disconnected from the system since this finding. The source of the PFAS at the Tradeport was aqueous film-forming foam that had been used to extinguish fires and

in training exercises at the former Air Force Base.

Over the past three years, the Harrison Well and the Smith Well on the Peace Tradeport Water System and Portsmouth #1 Well and Collins Well in the Portsmouth Water System, have been routinely monitored for PFAS by the Air Force. The City of Portsmouth samples all of the other Portsmouth water supply sources routinely. Sample results from 2016 are summarized in the PFAS Table in this report. All of the monitoring data is available on the City of Portsmouth website: www.cityofportsmouth.com, in the Drinking Water Quality Link.

In September 2016, the City of installed a granular activated carbon (GAC) filtration system to treat the water from the Harrison Well and Smith Well. Testing of this system has demonstrated effective removal of PFAS. The City is currently negotiating with the Air Force for the design and upgrades to the Peace Water Treatment Facility on Grafton Road that will allow for the treatment of all three Peace Wells with a GAC system.

PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

	Water From Portsmouth System Supplied as Needed (0% to 50% of Total Peace Supply)								Peace Sources**		Treated Well*** Haven**
PER- AND POLYFLUOROALKYL SUBSTANCE (concentrations reported in µg/L or ppt)	PORTSMOUTH #1 WELL	COLLINS WELL	GREENLAND WELL	HARRISON WELL 2	HARRISON WELL 3	HARRISON WELL 4	BELLAMY RESERVOIR	WATER TREATMENT PLANT	SIXTH WELL	HARRISON WELL	GAC TREATMENT
<i># of samples in 2016:</i>	11	12	2	1	2	1	2	1	42	24	7
6:2 Fluorotelomer sulfonate (6:2 FTS)	Average	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Range	ND to 0	ND	ND to 7	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorooctane sulfonic acid (PFOS)	Average	4	9	2	4	4	4	4	6	5	ND
Range	ND to 6	ND to 16	ND to 4	4	ND to 4	4	4	4	ND to 10	ND to 10	ND
Perfluorooctanoic acid (PFOA)	Average	8	9	ND	ND	ND	ND	ND	8	9	ND
Range	ND to 9	ND to 13	ND	ND	ND	ND	ND	ND	ND to 10	ND to 13	ND
Perfluorohexanesulfonic acid (PFHxS)	Average	ND	ND	ND	ND	ND	ND	ND	5	7	ND
Range	ND	ND	ND	ND	ND	ND	ND	ND	ND to 8	ND to 10	ND
Perfluorohexanecarboxylic acid (PFHpA)	Average	6	ND	ND	ND	ND	ND	ND	6	9	ND
Range	ND to 8	ND	ND	ND	ND	ND	ND	ND	ND to 8	5 to 14	ND
Perfluorononanesulfonic acid (PFNnS)	Average	9	6	6	4	ND	ND	ND	14	28	ND
Range	6 to 12	ND to 8	ND to 6	4	ND	ND	ND	ND	10 to 17	21 to 35	ND
Perfluorobenzenesulfonic acid (PFBS)	Average	7	ND	ND	ND	ND	ND	ND	6	9	ND
Range	ND to 10	ND	ND	ND	ND	ND	ND	ND	ND to 9	5 to 14	ND
****Perfluorooctanesulfonic acid (PFOS)	Average	6	6	9	ND	ND	ND	ND	11	24	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)	Average	7	6	ND	ND	ND	ND	ND	7	8	ND
Range	ND to 13	ND to 9	ND	ND	ND	ND	ND	ND	ND to 11	ND to 14	ND
Perfluorodecanecarboxylic acid (PFDA)	Average	6	6	ND	ND	ND	ND	ND	7	11	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	Average	10	7	9	ND	ND	ND	ND	14	31	ND
Range	6 to 14	ND to 12	7 to 14	ND	ND	ND	ND	ND	8 to 27	22 to 43	ND

* Data is laboratory analytical method detection limit, concentrations above those detected are combined estimates unless the amount measured is above 10 ng/gal (200)

** "As Detected above laboratory method detection limit"

*** Concentration from post-granular activated carbon (PGAC) treatment.

**** Exceeds trace. Maximum Level and HHS HQS for PFOS concentrations reported or combined is 70 ppt (200)

***** ND = Not Detected above laboratory method detection limit

***** ND = Not Detected above laboratory method detection limit

***** ND = Not Detected above laboratory method detection limit

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.

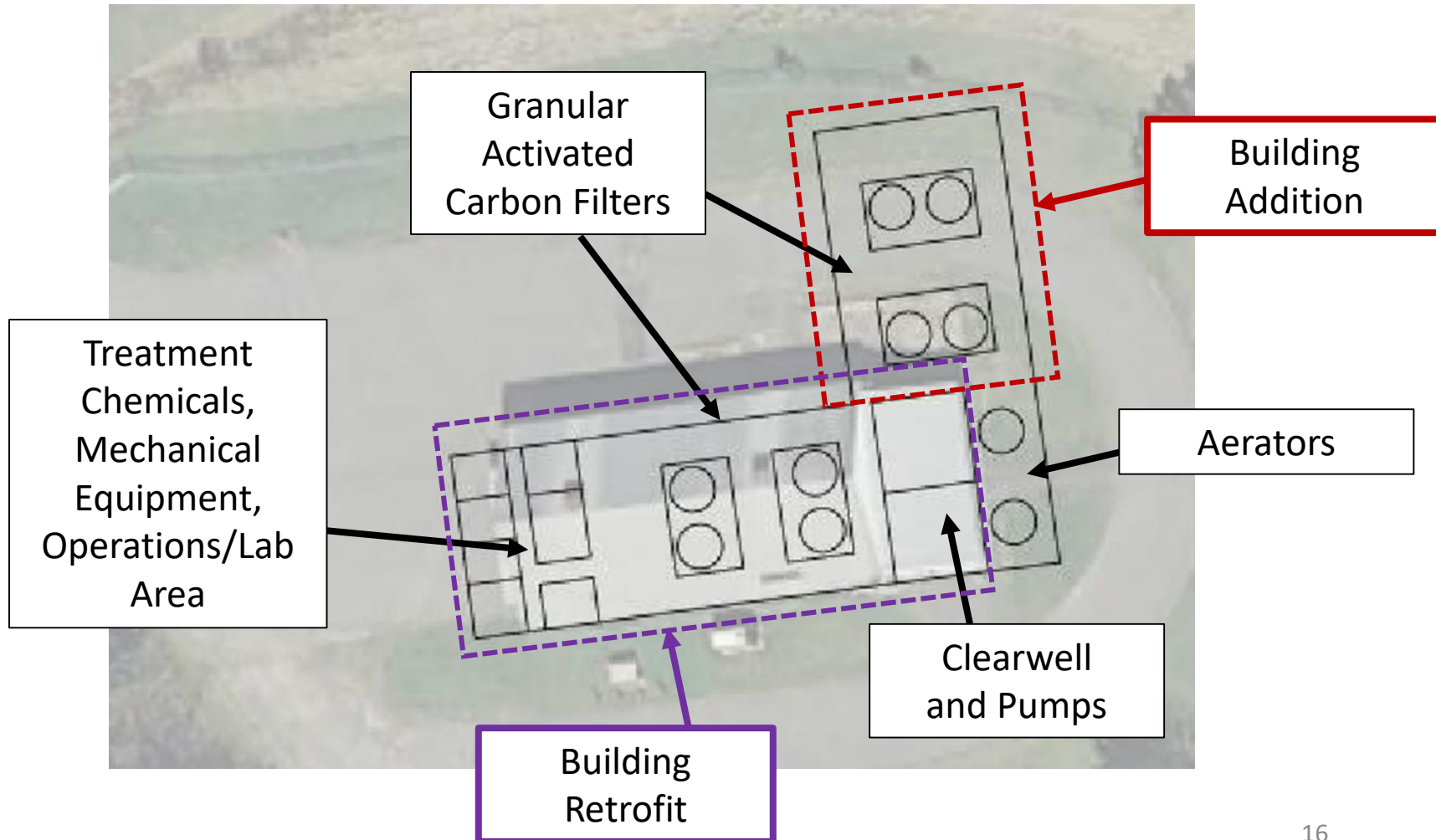
"The EPA has recommended granular activated carbon filtration for PFOS/PFOA treatment, and the Air Force has used GAC systems to successfully treat various contaminants," Kinkade said. "After installation, we monitor the system to ensure it is reducing PFOS/PFOA levels. And we are working with industry 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**



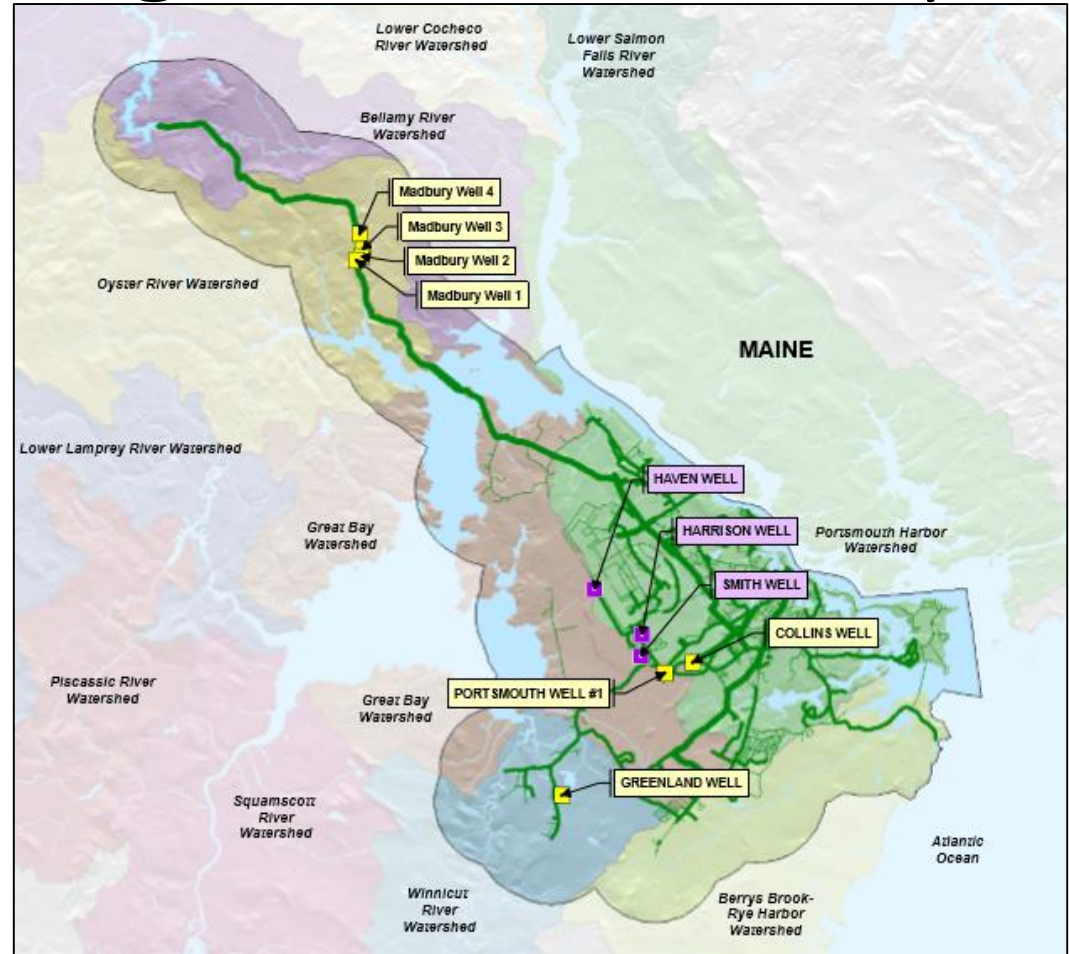
June 2009

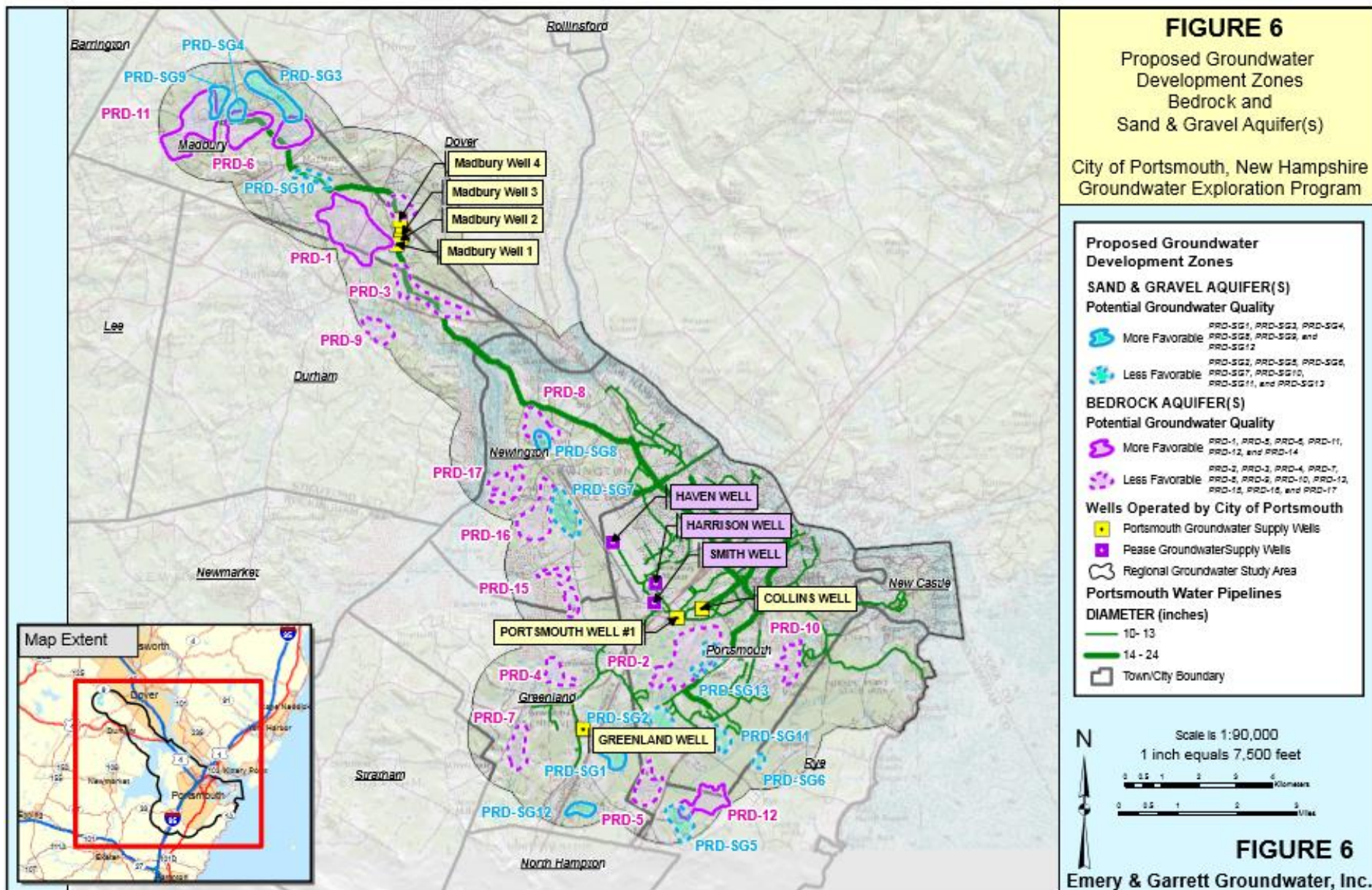
Presented to:

**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





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



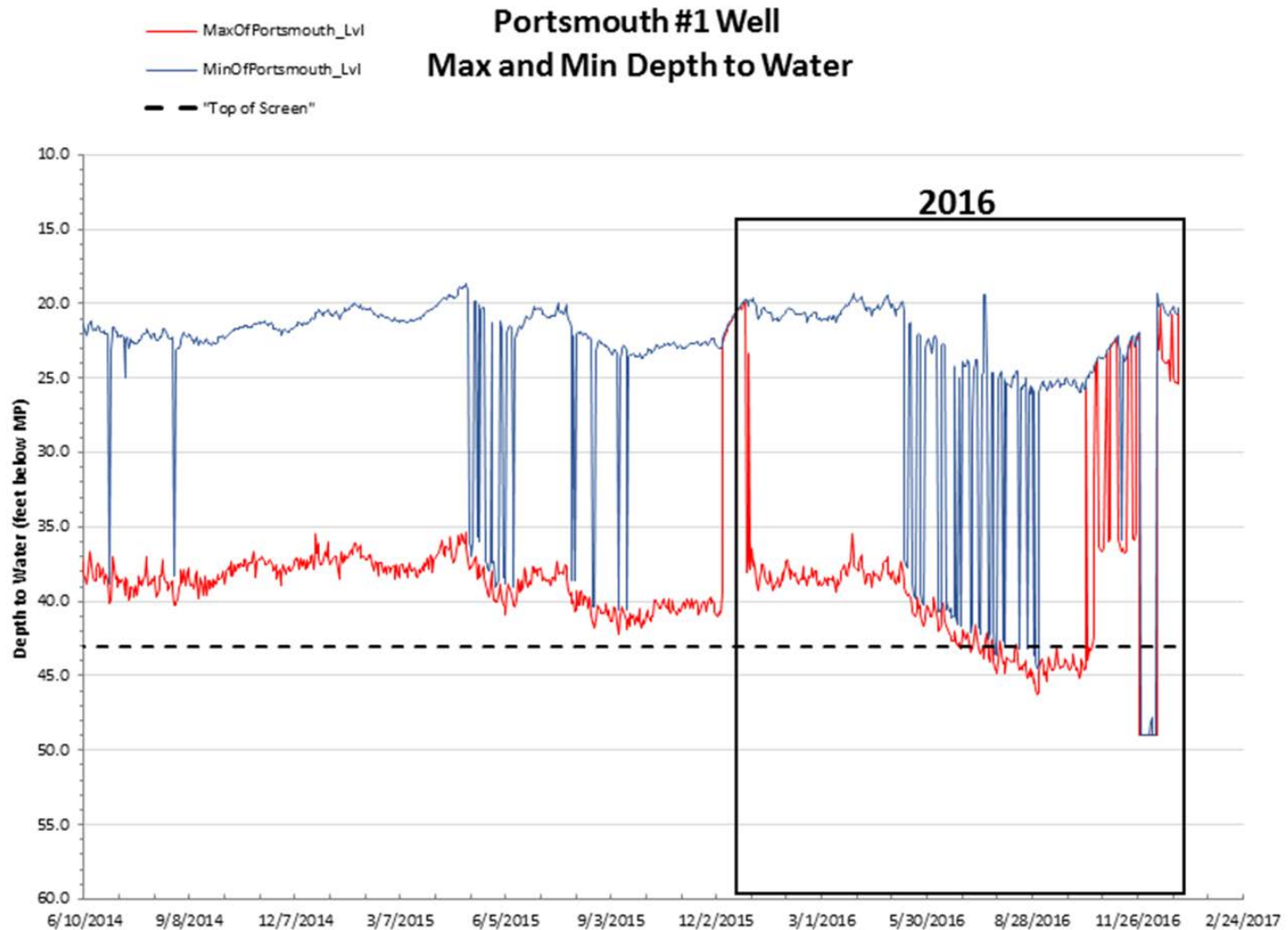
Madbury Well #5 Permitting - Ongoing
Madbury Public Hearing – February 2017

Greenland Well Replacement



New Well in 2015
Pump Station replacement in 2017

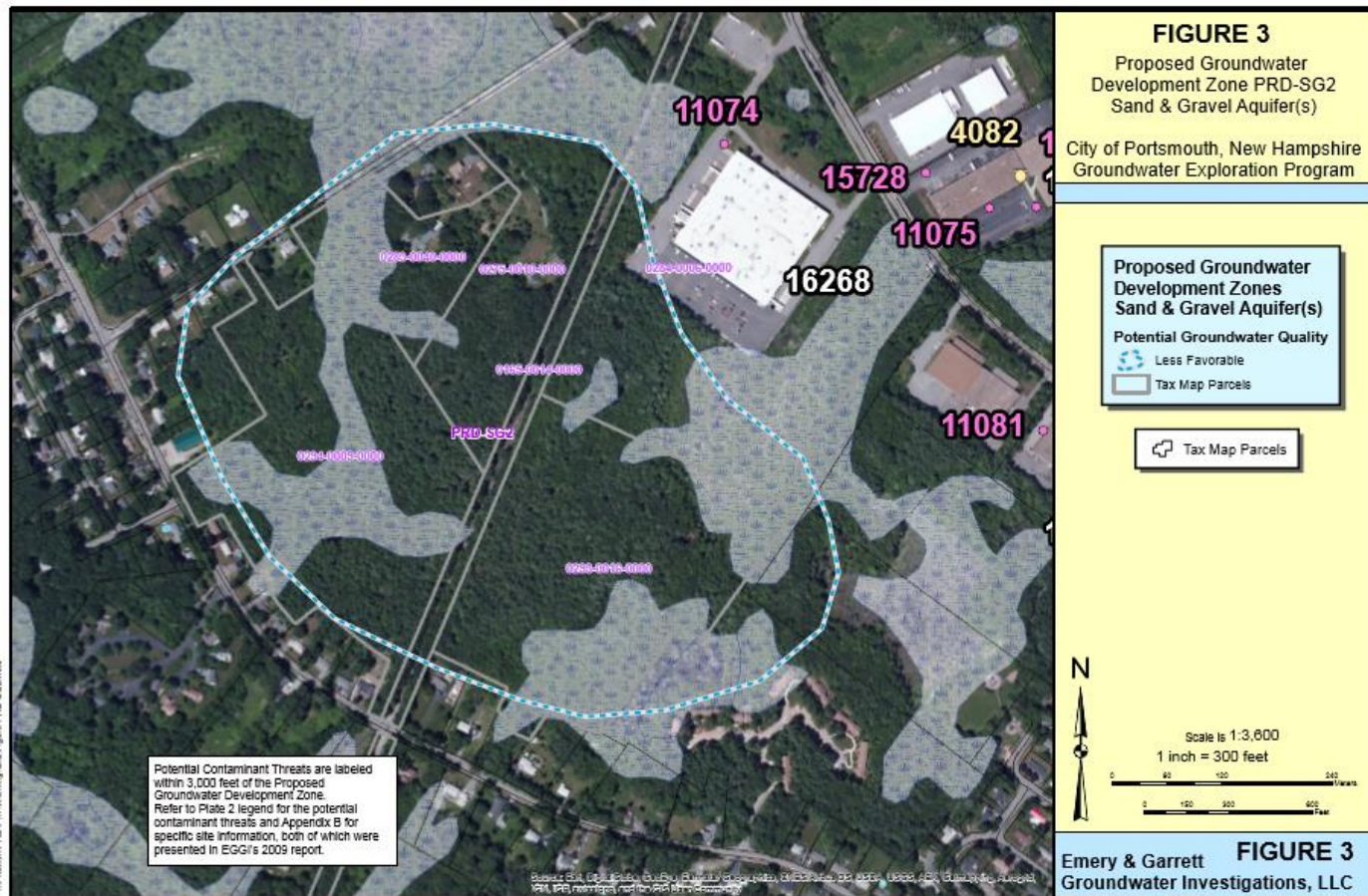
Well Maintenance – Well Cleaning



Water Supply Alternatives

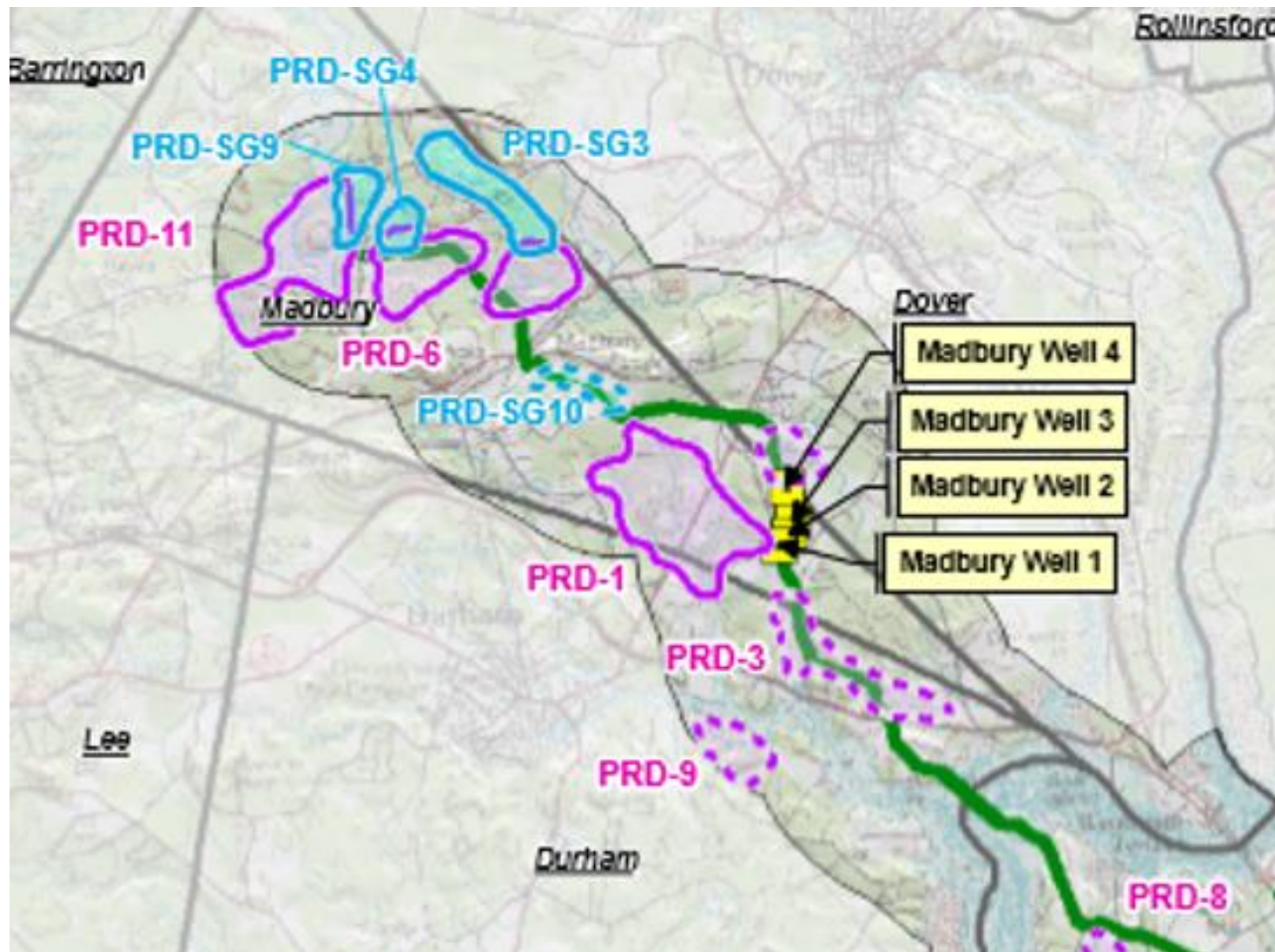
- **Water Supply Augmentation Study – 2014-2016 work associated with the Haven Well contamination.**
- Following the contamination of the Haven Well in 2014, the Air Force agreed to fund additional study on the sites previously identified by EGGI in their 2008 report. The focus of this study was to conduct 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.

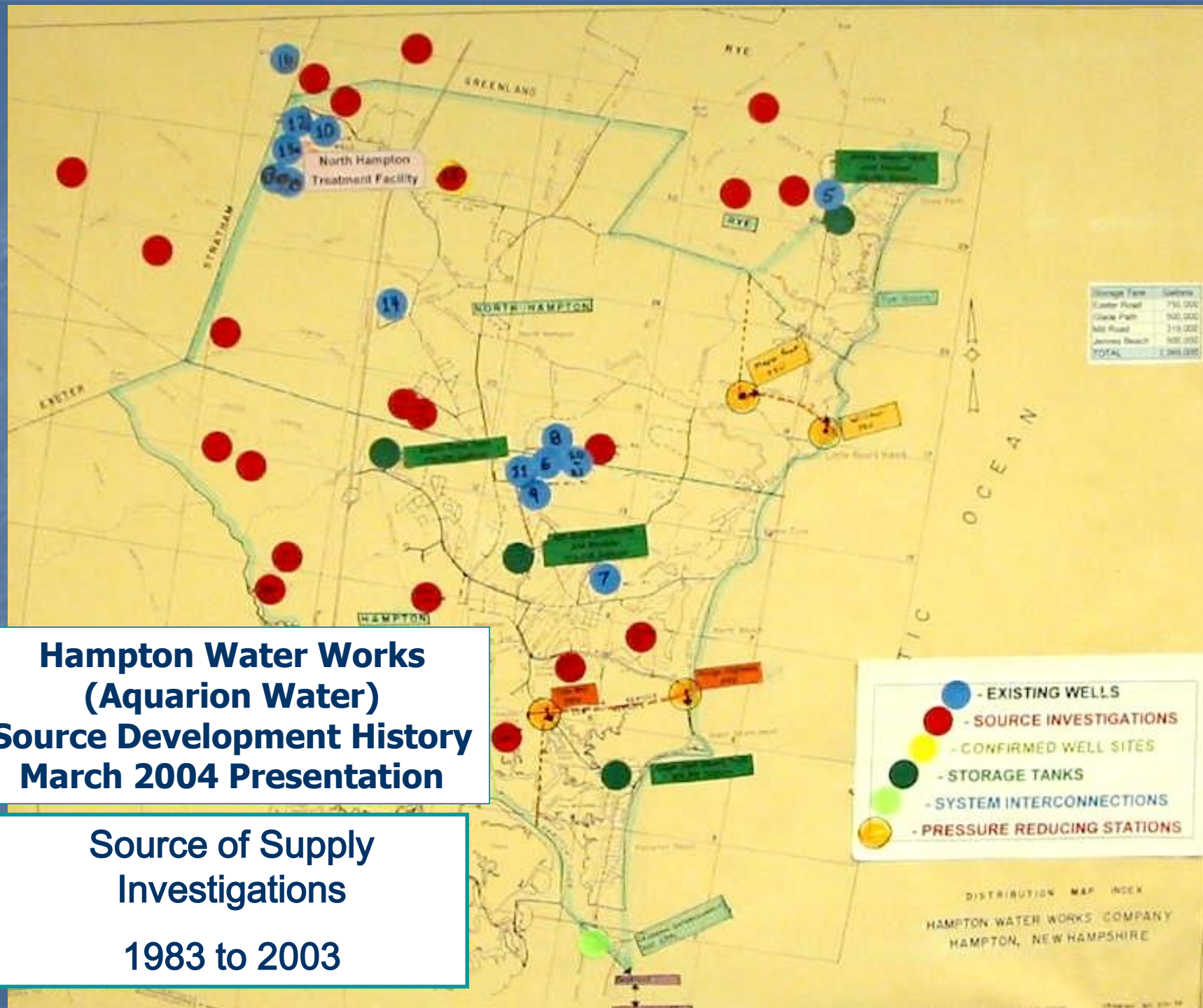
2014 – 2016 Hydrogeologic Study



- 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


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	

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.

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.

Compliance with this water use restriction is enforced with two warning notifications and fines of \$100 per violation after that.

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.

Portsmouth Water Division – Water Supply Update

October 4, 2016

Water Supply Is Really Two Things:

1. Quality
2. Quantity

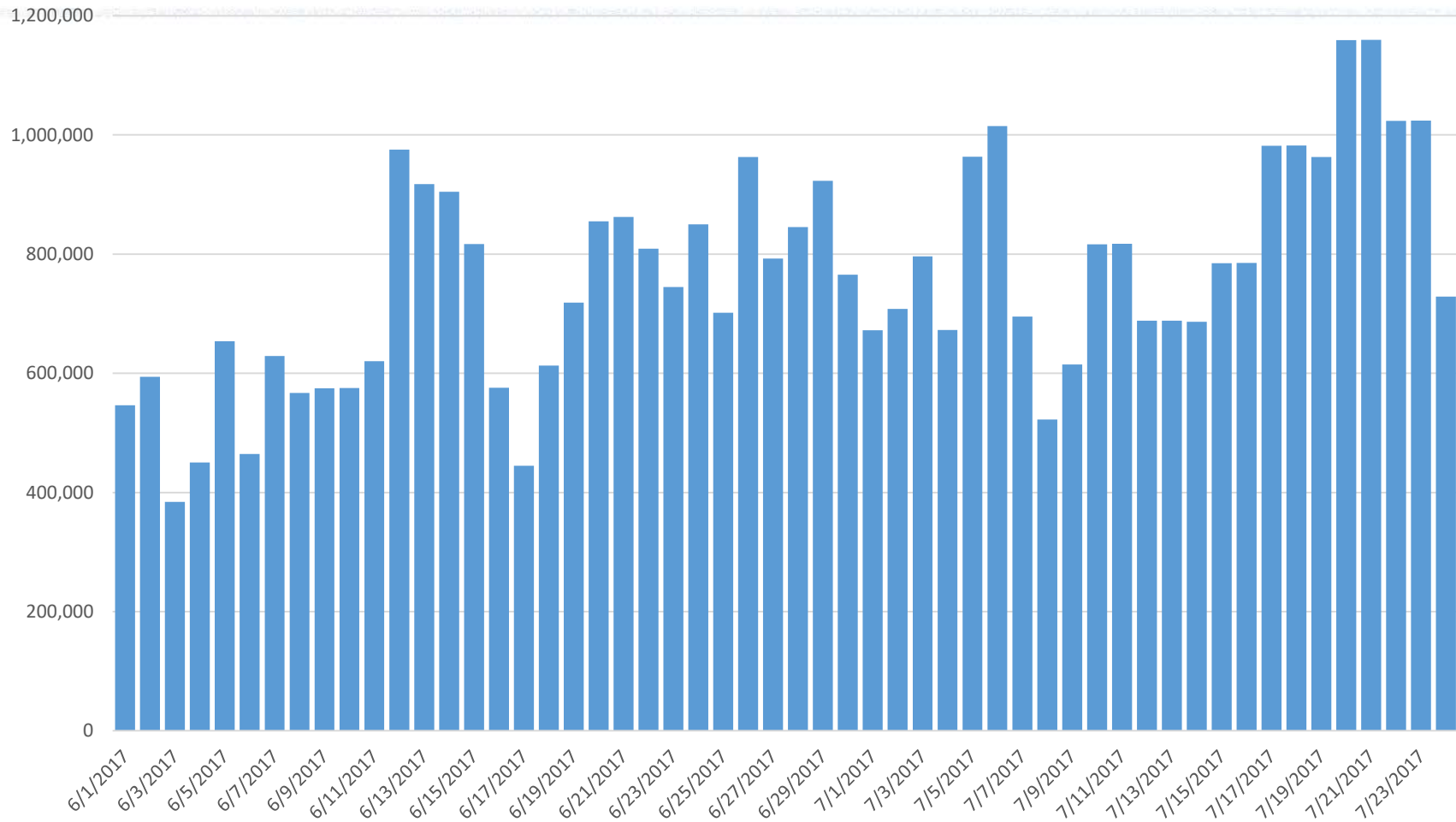
State Street Saloon Fire – April 9, 2017

- 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

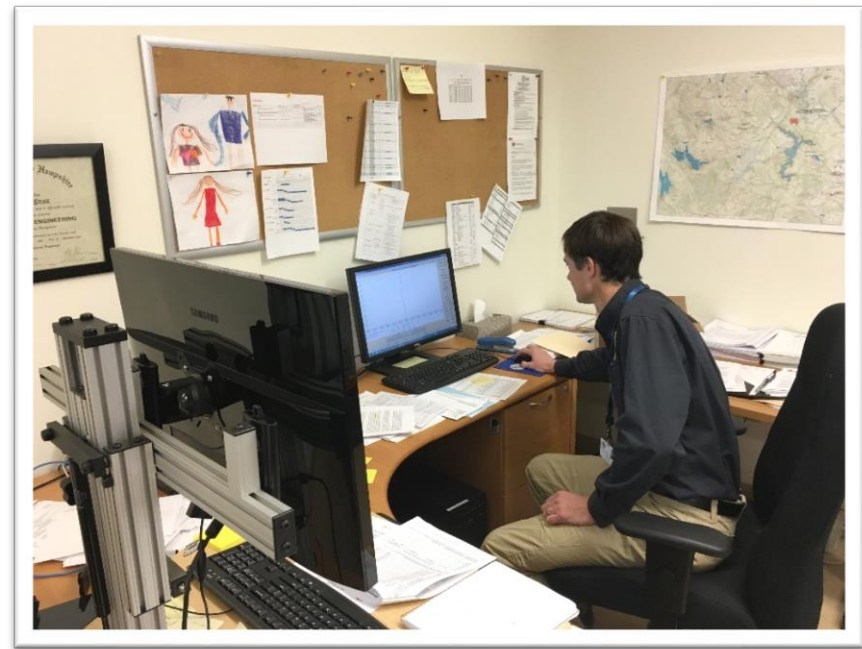


Meeting Peak Water Demand

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

September 2005



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

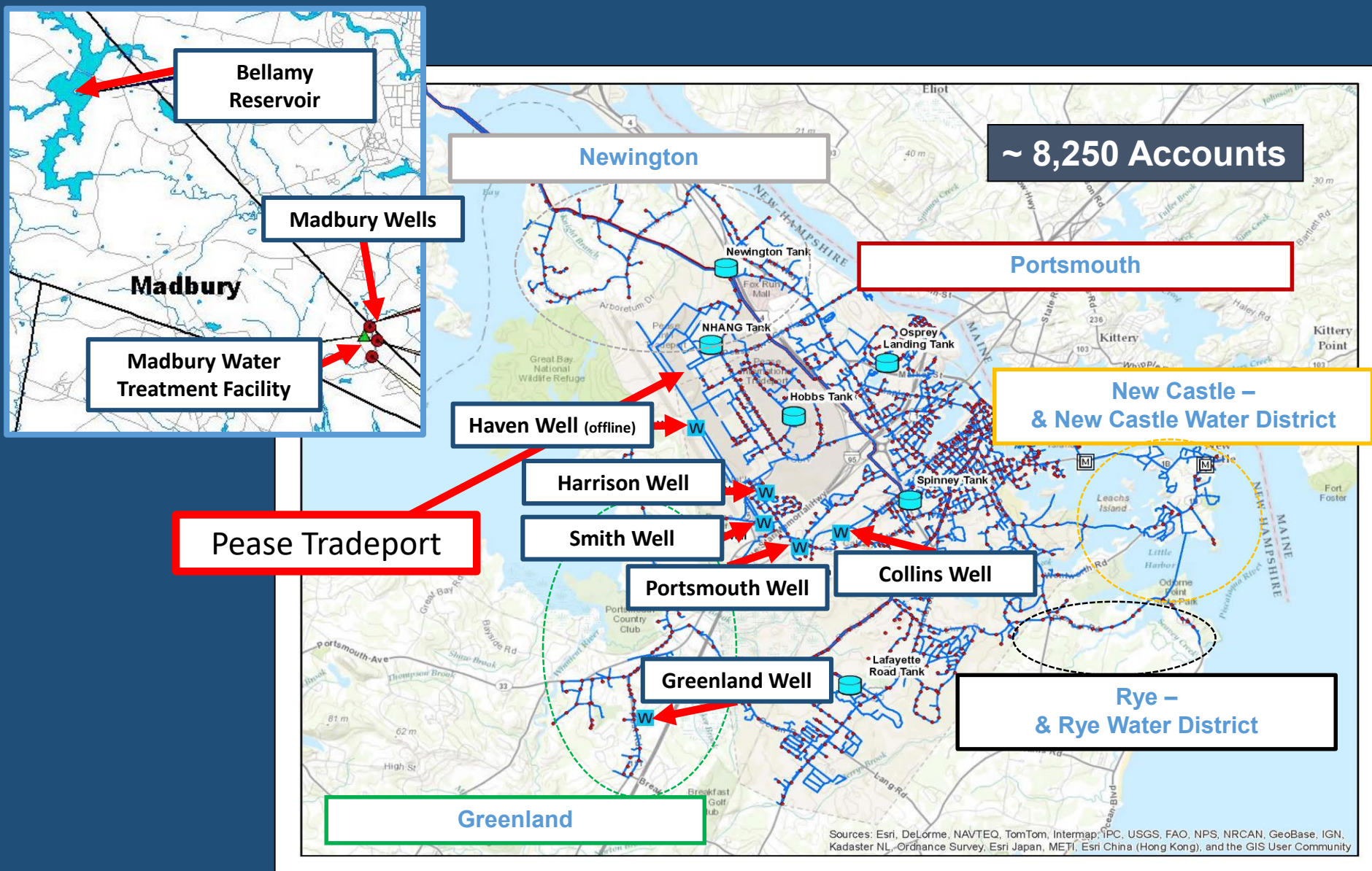
Assessment of Ground-Water Resources in the Seacoast Region of New Hampshire



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

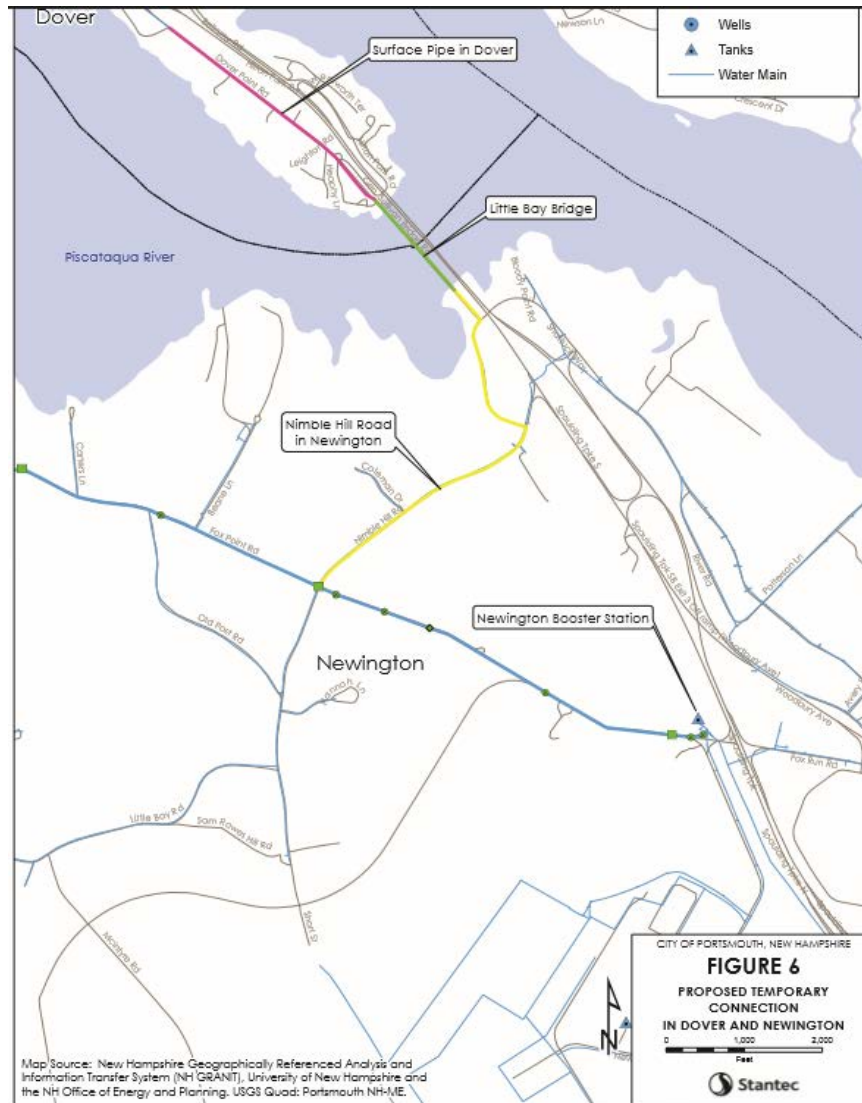
- 189 miles of pipe
- 972 Public Fire Hydrants
- 2,840 Valves
- 8,203 Meters/Customers
- Serve 5 Communities and portions of 3 others



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

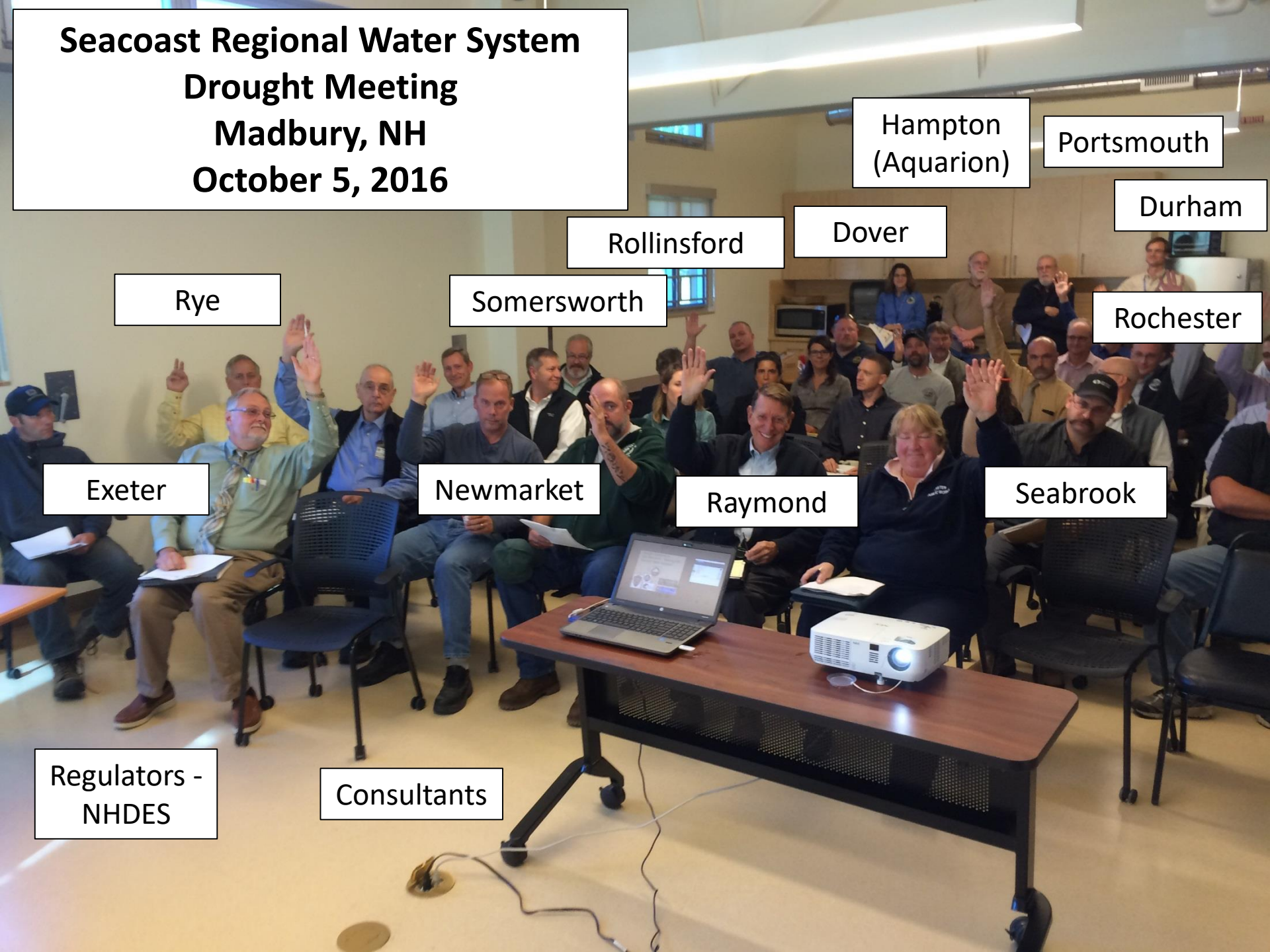
Newmarket

Raymond

Seabrook

Regulators -
NHDES

Consultants



Questions?

