“The Pease Tradeport Water System PFAS Experience - Five Years Later”

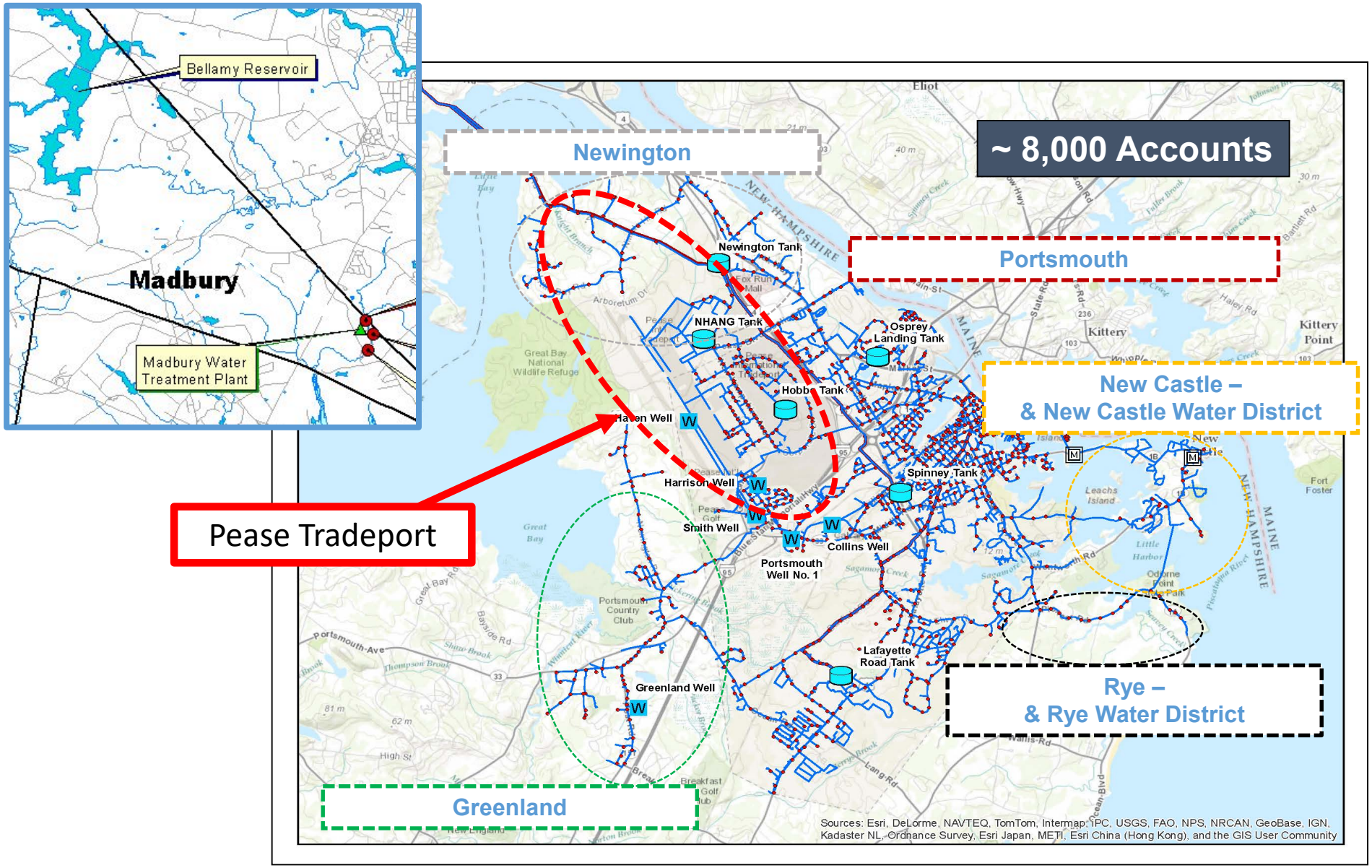
Brian Goetz, Deputy Director of Public Works
and
Al Pratt P.E., Water Supply Operations Manager

City of Portsmouth, New Hampshire

AEHS Foundation Semi-Annual Meeting

October 22, 2019

Portsmouth Regional and Pease International Tradeport Water Systems



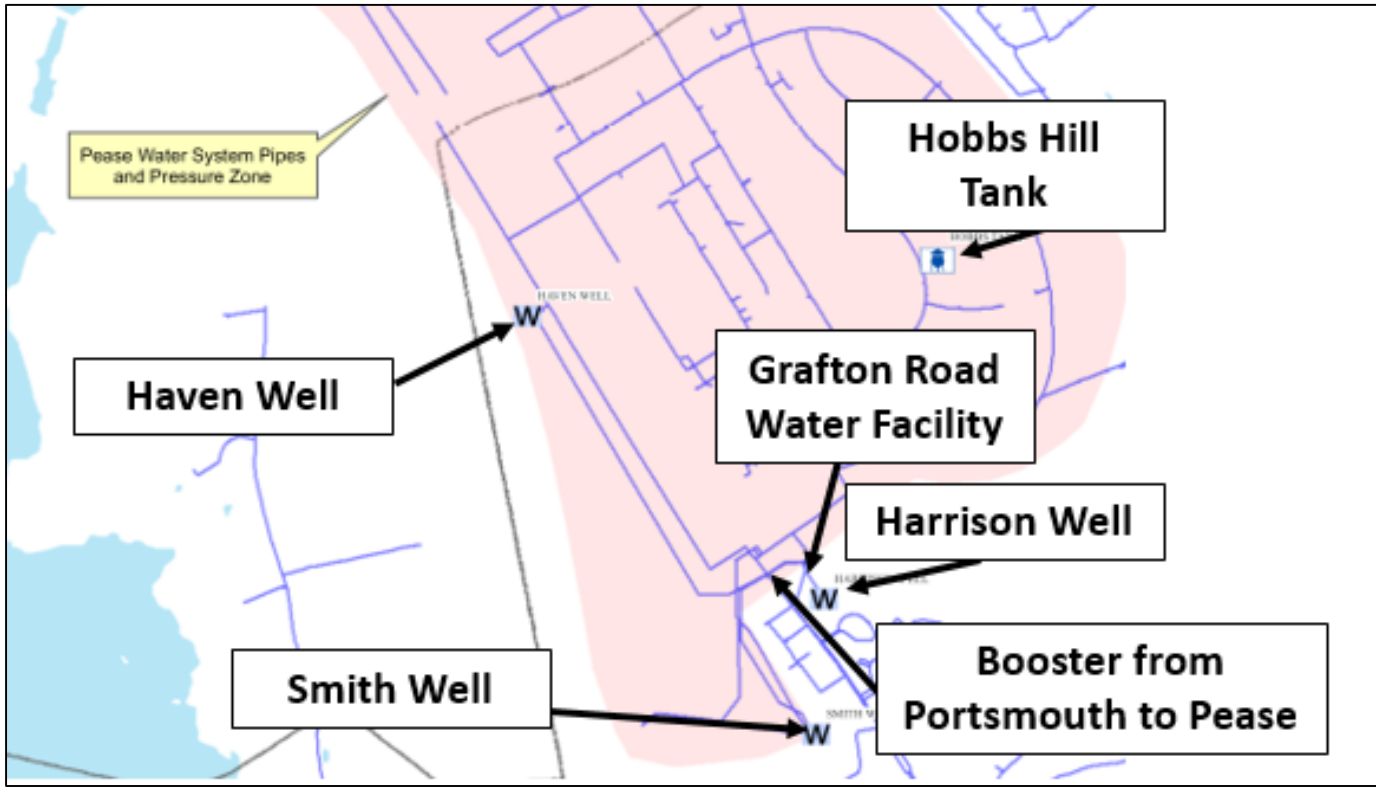
The Pease Tradeport

- Pease, which was a Strategic Air Command facility and Air Force base from the 1950's until 1991,
- The former Pease Air Force Base is located in Portsmouth and Newington, New Hampshire. The facility officially closed in April 1991 under the Defense Base Realignment
- Now home to more than 250 businesses employing over 10,500 workers, a commercial airport, the Air National Guard and a golf course
- Pease includes five secondary education institutions, various restaurants and daycare providers

Water Treatment Plant History

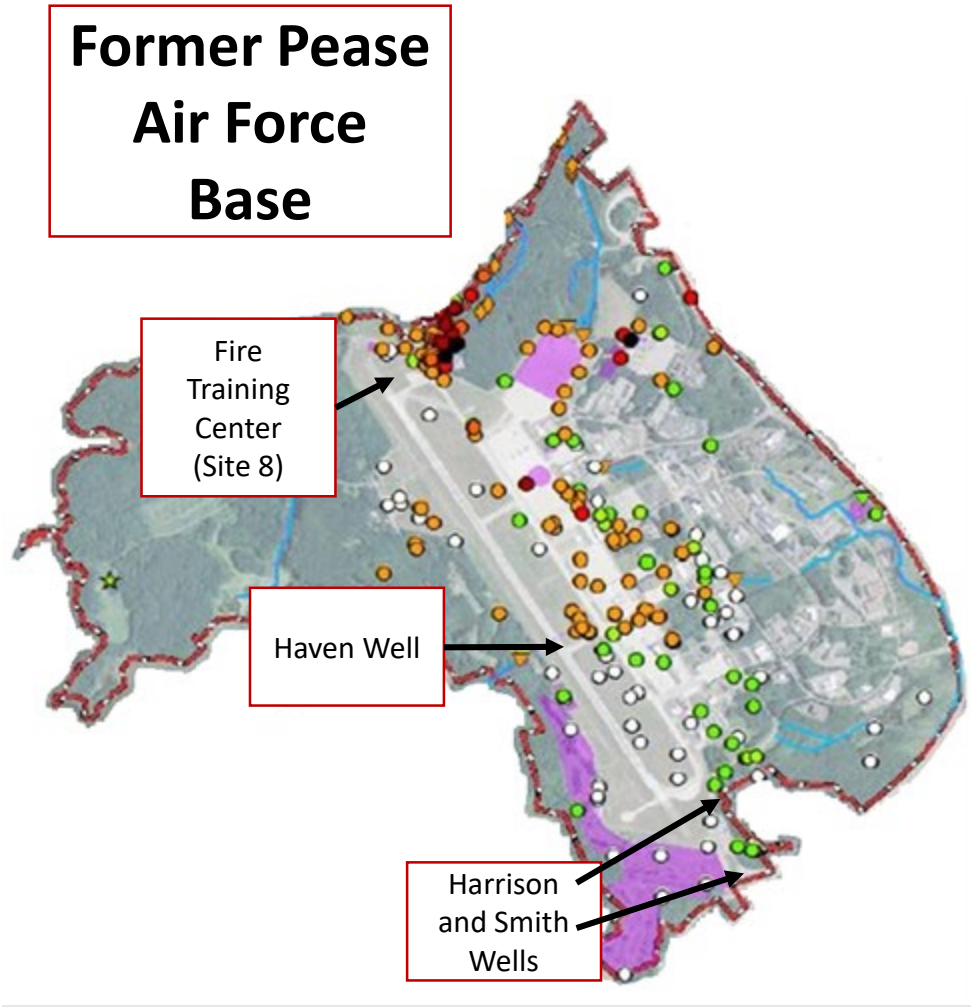
- VOCs plumes (TCE/PCE) found around Haven Well
- A WTP constructed in the mid 1980's to treat for VOCs
- 1990 site remediation started under CERCLA
- Due to low demand (base closure) and steadily improving GW quality, WTP never activated, equipment removed in 2013
  - Results of monthly VOC sampling never triggered treatment

Pease International Tradeport Grafton Road Water Facility in 2014



Pease Tradeport Water System PFAS Contamination

- **April 2014** – NHDES contacts City of Portsmouth to sample the three Pease Tradeport water system wells for PFAS due to detections at former Fire Training Center and past use of AFFF
- **May 12, 2014** – City staff are notified that PFAS levels in Haven Well exceeded the EPA's Health Advisory Standard for PFOS
  - 2,500 ppt (Preliminary Health Advisory = 200 ppt)
- **May 12, 2014**
  - Haven Well is shut down
  - Portsmouth water supplements water lost from Haven Well (up to 500,000 gpday)
  - Smith and Harrison wells remain in service

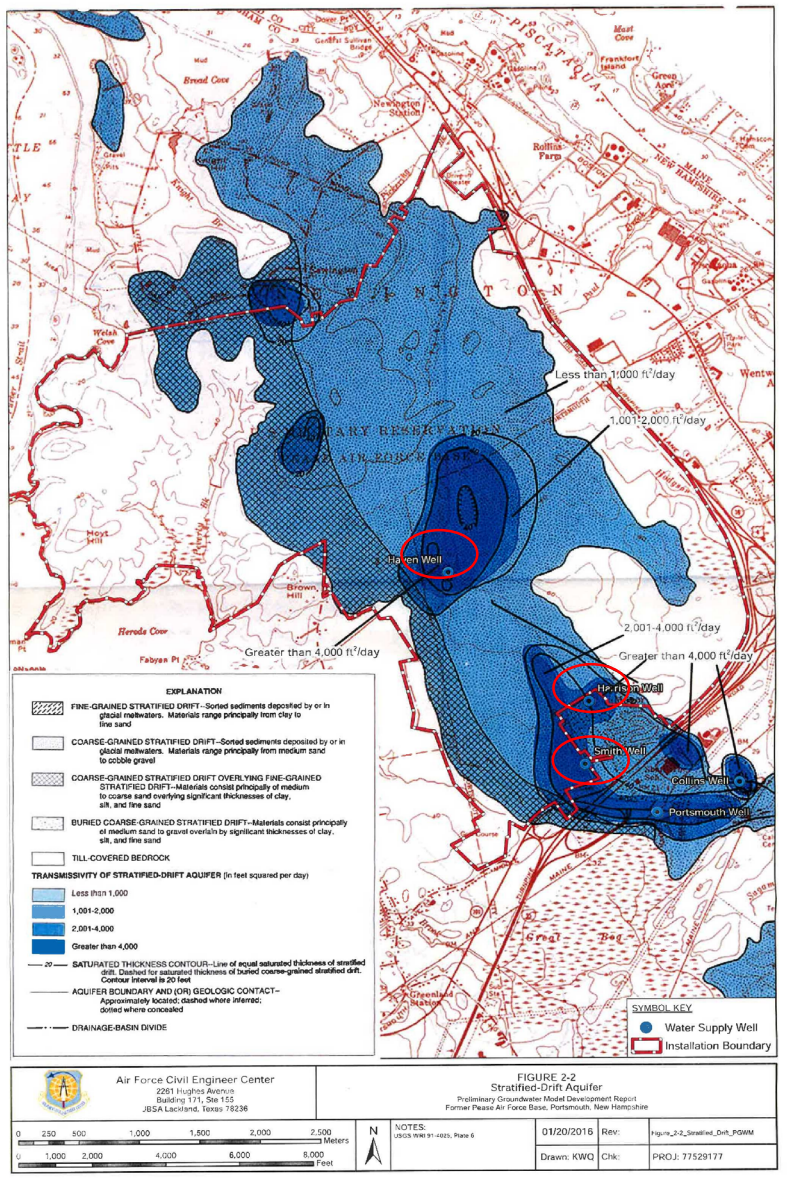


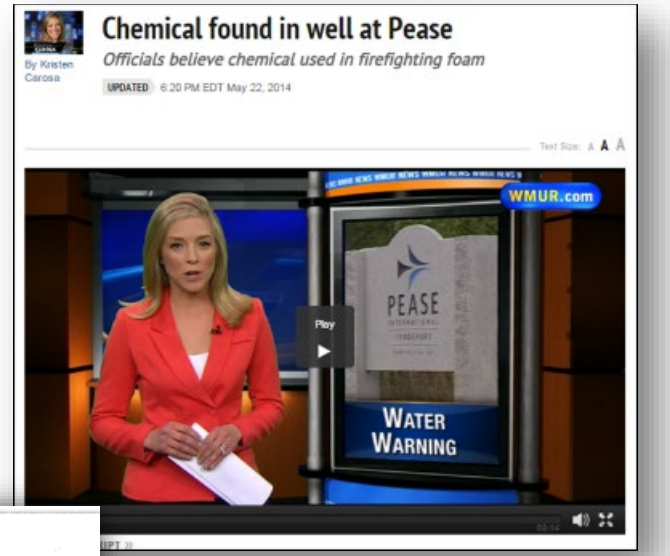
Drinking Water Sources

Initial Haven Well sample came back at 2.5 µg/L for PFOS

Well	Flow Rate (gpm)	PFOA+PFOS (µg/L)
Harrison	286	0.029
Smith	343	0.012
Haven	534	1.495

Average PFOA+PFOS concentrations, Harrison and Smith: 2016-2017, Haven: 2016





Article published May 22, 2014

Contaminated well shut down at Pease Tradeport

PORTSMOUTH — A well that serves the Pease International Tradeport has been shut down after testing positive for a chemical contaminant, according to the state Department of Environmental Services.

What caused this contamination?

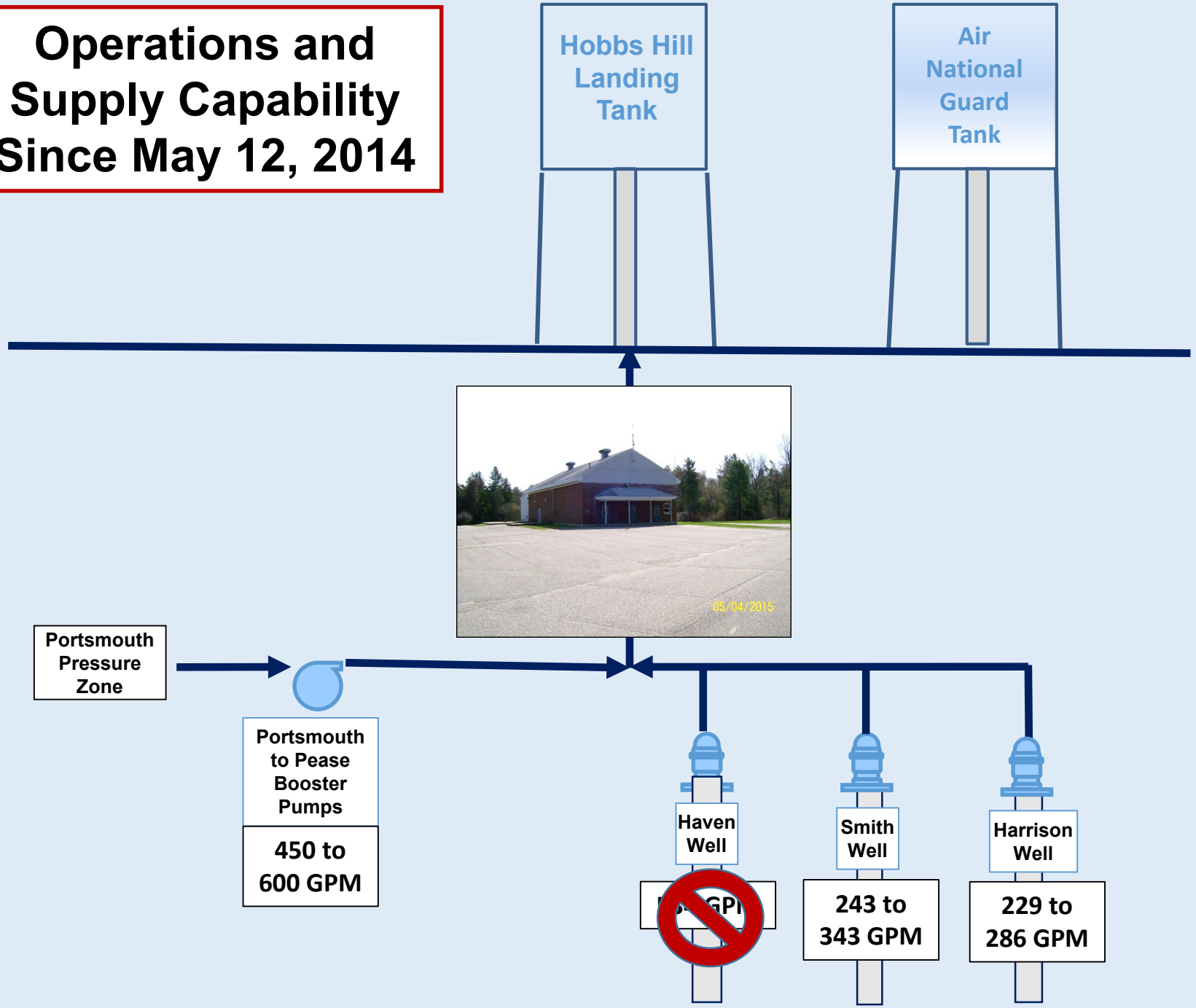
PFOS and PFOA are components of legacy Aqueous Film Forming Foam (AFFF) the Air Force began using in the 1970s as a firefighting agent to extinguish petroleum fires, used or released at:

- Fire Training Center for former Pease Air Base
- Use to fight fires
- Potential spills

KC-135E Fire at Pease AFB January 1990

https://www.youtube.com/watch?v=8W_zJfJGhSI&feature=youtu.be

Operations and Supply Capability Since May 12, 2014



Technical Response Team

- City of Portsmouth Staff
  - City consultants
- Pease Development Authority
- Environmental Protection Agency
- New Hampshire Department of Environmental Services
  - Waste Division
  - Drinking Water and Groundwater Bureau
- Air Force Civil Engineering
  - Air Force Consultants
- New Hampshire Health and Human Services
- Agency for Toxic Substances and Disease Registry (ATSDR)
- Others, depending on topic

Air Force Agreements to Address Contamination

- September 2014
  - Hydrogeologic study for replacement well
  - Technical support assistance reimbursement
- November 2015
  - Preliminary Treatment Assessment
- April 2016
  - Treatment Pilot and Demonstration Project
- February 2017
  - Additional Treatment Design Evaluation
- August 2017
  - Final Design of Treatment for Pease Tradeport wells
- September 2018
  - Facility Construction
- Pending
  - Long-term operations and maintenance

May 28, 2014:
State, Health and Water System Officials Hold First Public Meeting

Public Involvement:

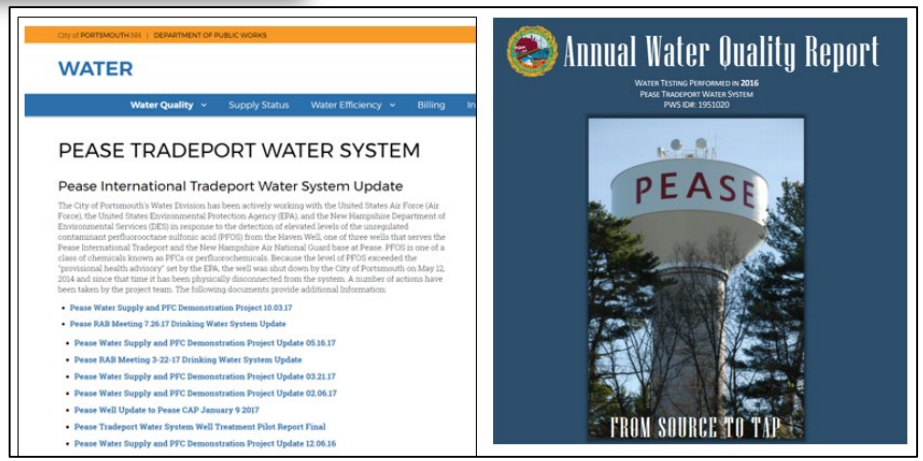
- Press Releases by NHDES and City
- Public Meeting at Pease – May 28, 2014
- Presentations to Portsmouth City Council and Other Groups
- Federal and State delegation involvement
- “Testing for Pease” Advocacy group
- Haven Well Community Advisory Board
  - 14 public meetings in 2014
- ATSDR Community Assistance Panel (CAP)
  - Formed in 2016 to address long-term health concerns
- Pease Restoration Advisory Board (RAB)
  - Reestablished in 2016 – Meets every quarter
- Extensive Information by City and State:
  - www.cityofportsmouth.com
  - Full page dedicated to PFAS in Annual Water Quality Report
- “A lot” of News Coverage!

Shaheen Questions Nominee to Serve as Under Secretary of the Air Force on Pease Well Contamination

SenatorShaheen

Subscribe 171

23 views



Blood Testing and Health Studies

- Blood Testing
  - March 31st, 2015 – Public Meeting where NHHS Announces Protocol for Pease Blood Testing
  - 1,181 Adults tested
  - 366 Children tested
  - Three public meetings announcing blood test results
- Health Consultation Study
  - Draft Report issued March 2019

Other Ongoing Studies

ATSDR Expert Panel Meeting – Atlanta – June 2019

ATSDR

U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Portsmouth, NH

Pease Study
PFAS Health Effects

October 24, 2019
5:30 p.m. – 8:00 p.m.

Location:
Holiday Inn Portsmouth
300 Woodbury Ave
Portsmouth, NH 03801

Public Outreach:

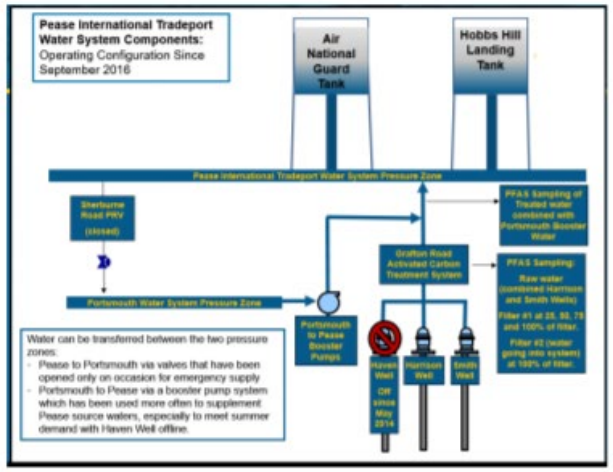
Meetings, Website, Press Releases

City of
Portsmouth
Department of Public Works

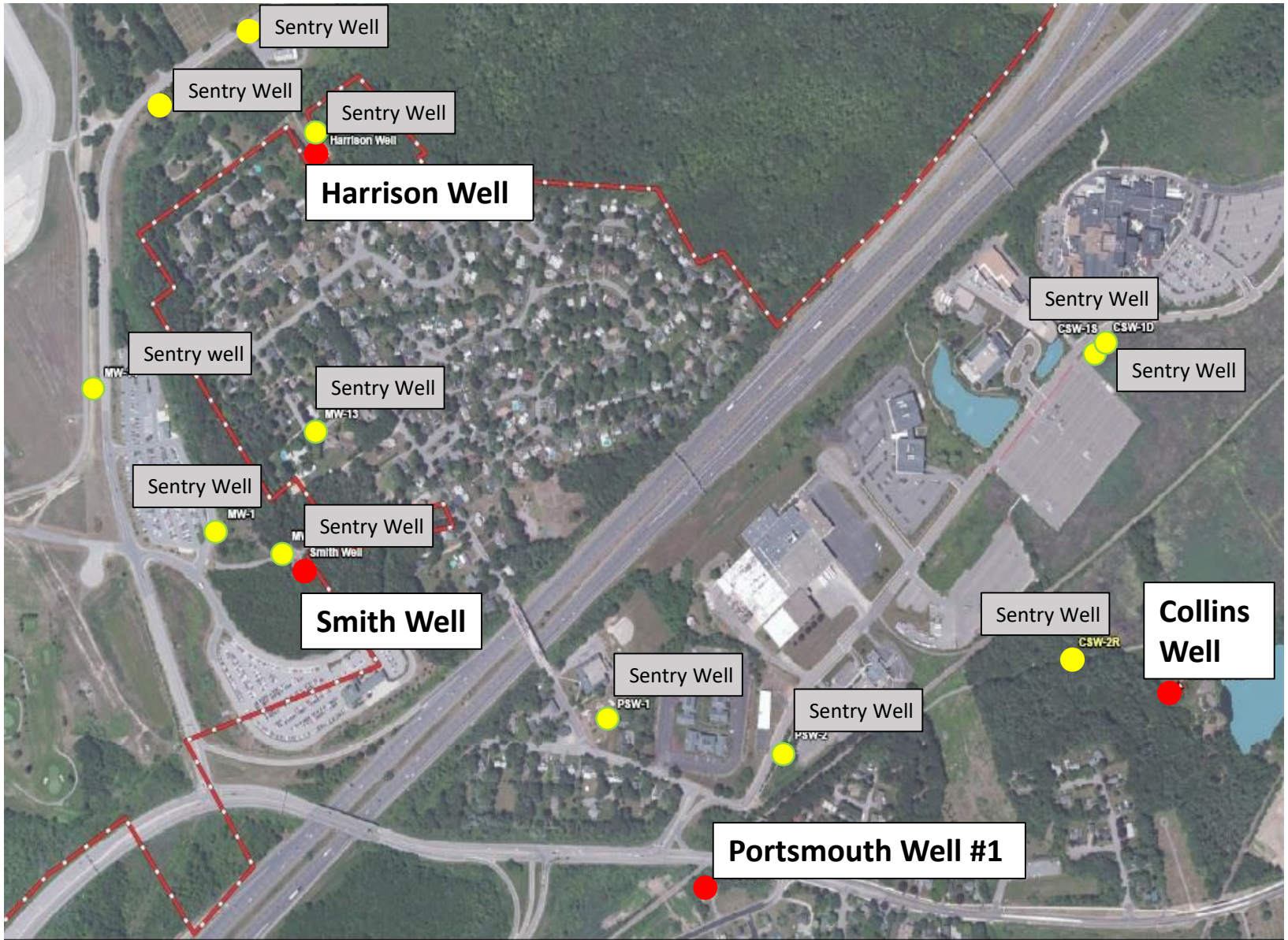
July 31, 2019

PEASE TRADEPORT WATER SUPPLY UPDATE

The City's engineering consultant continues to sample the performance of the activated carbon filters based on the amount of water treated. With the newly adopted New Hampshire Maximum Contaminant Levels (MCLs) for PFOA, PFOS, PFHxS and PFNA in place we are now sampling at the recommended lab detection limit which goes down to 2 ppt. Per NHDES, any sample with "estimated numbers below the reporting limit are considered non-detects." Due to the loss of the Haven Well, in order to meet the Pease Tradeport Water System demand, water from the Portsmouth water system is boosted into the Pease system and blended with the treated water from the Harrison and Smith wells. Samples of that blended water are also taken. The following graphic and table provides a summary of the system configuration and testing results. Comprehensive sample data since the filters were changed out in November 2018 is attached. Per NHDES rules, after October 1, 2019, we will begin to report the data as a 4-quarter rolling average.



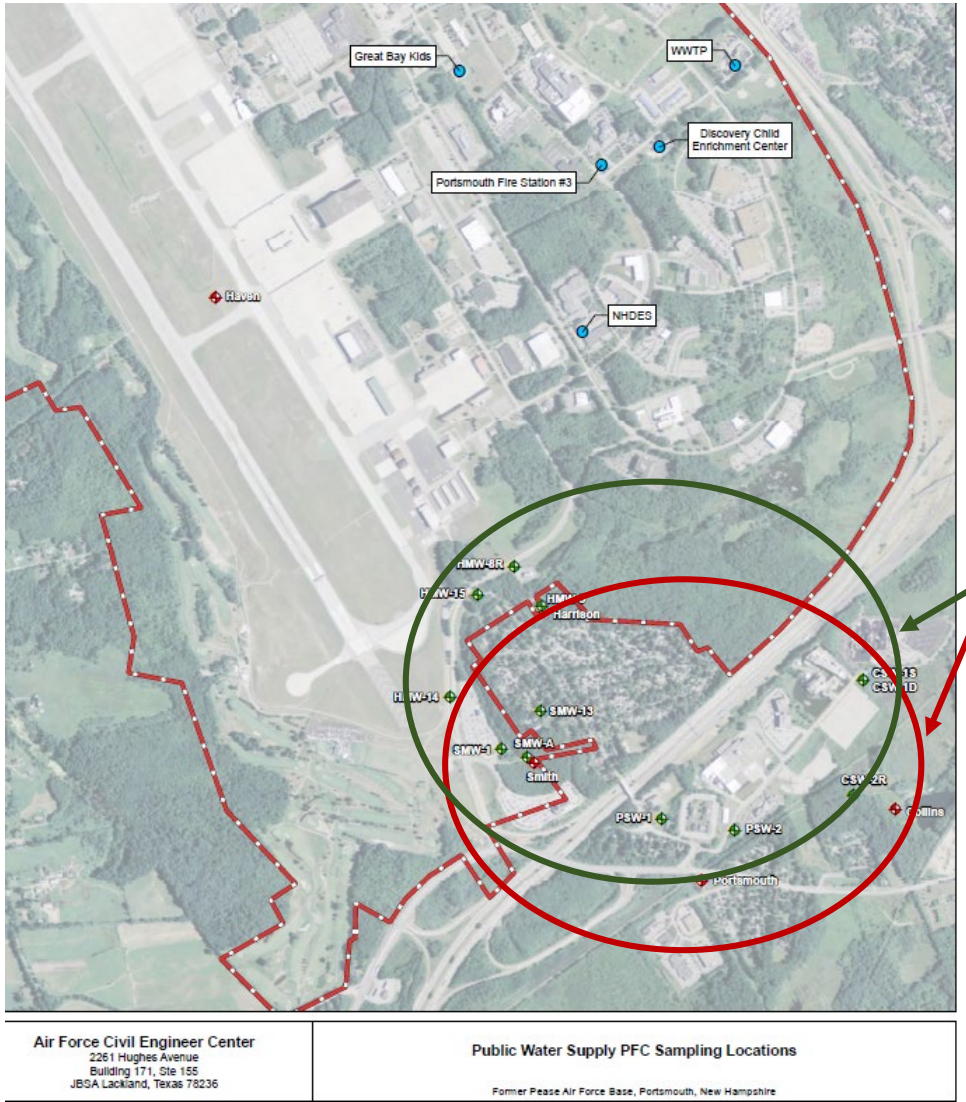
Southern Water Supply Well Field Municipal and Monitoring Wells
Monthly PFAS Sampling Since May 2014



Over Five Years of Data and Analysis

- The third Unregulated Contaminant Monitoring Rule (UCMR 3) was published on May 2, 2012.
- 6 PFAS compounds sampled:
  - PFBS - Perfluorobutane Sulfonate
  - PFHpA - Perfluoroheptanoic Acid
  - PFHxS - Perfluorohexane Sulfonate
  - PFOA - Perfluoro-n-Octanoic Acid
  - PFNA - Perfluorononanoic Acid
  - PFOS - Perfluorooctane Sulfonate
- Pease Technical Group opted to sample for 23 compounds and also use lower detection levels
- 5 years of sampling:
  - Initially, sampling every week
  - Currently sampling monthly at some wells and quarterly at others
- Hydrogeological modeling and additional monitoring sites continue to fill the gaps in analysis
- Monitoring data posted on City's Website

Monitor –
PFAS Monitoring Locations around Pease and Portsmouth Drinking Water Wells



Production Wells - Monthly:

- Smith
- Harrison
- Portsmouth
- Collins

Sentry Wells

- 11 Wells - Quarterly

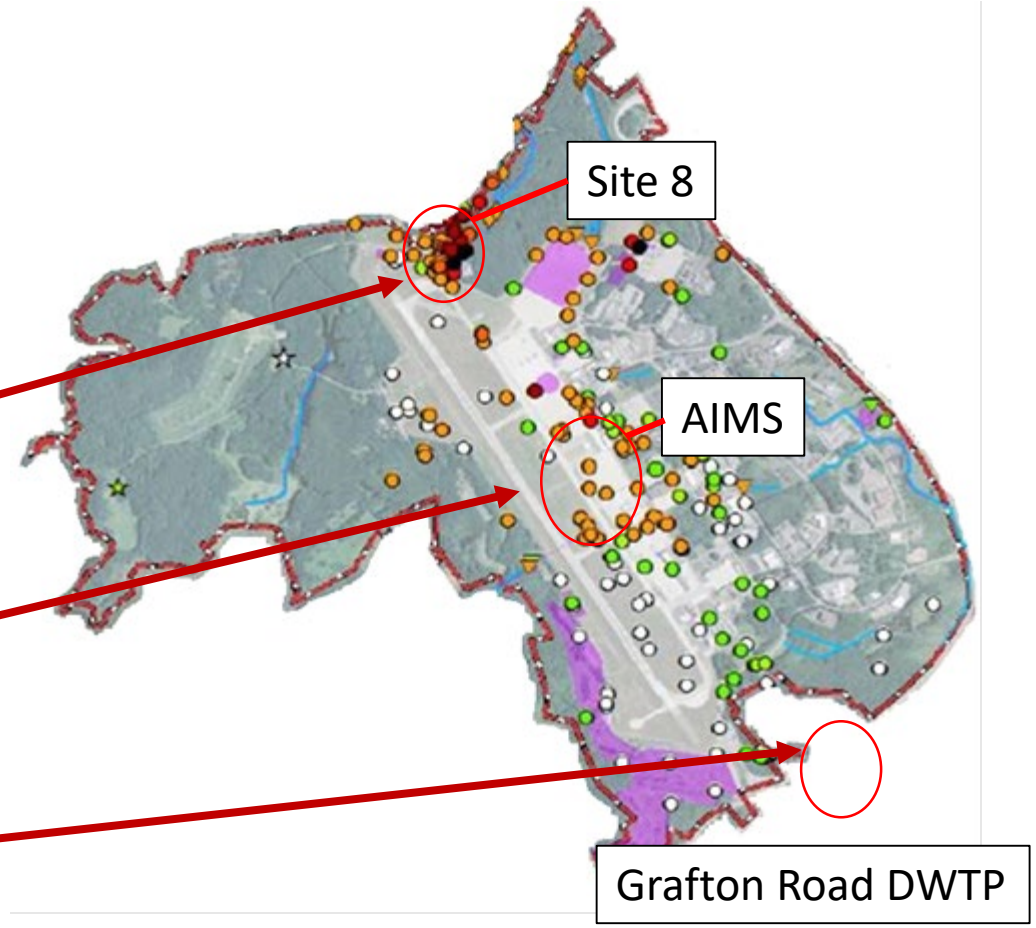
Well	Samples Since May 12
Harrison	105
Smith	151
Collins	70
Portsmouth	69

Changing Drinking Water Standards

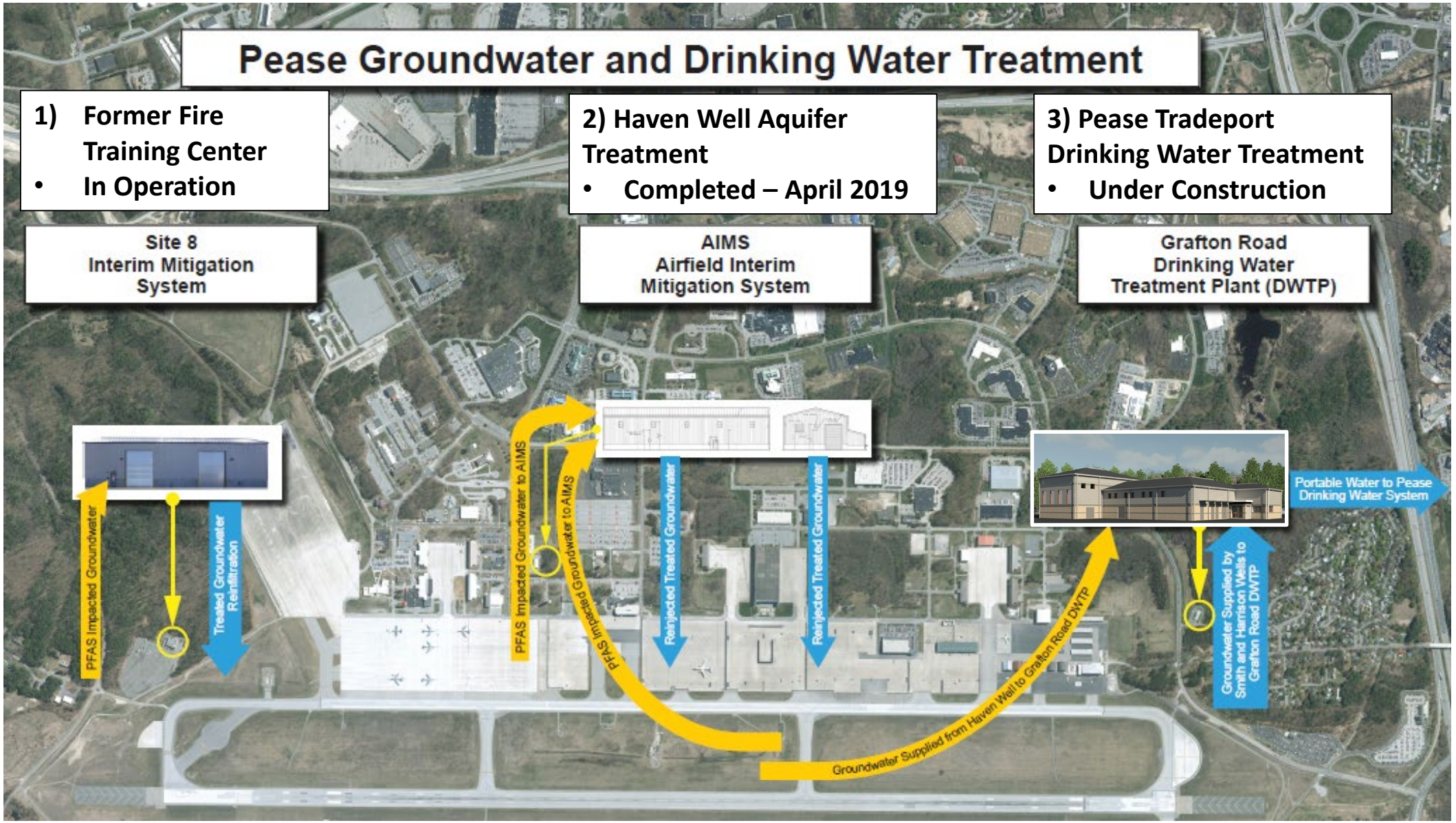
- 2009 – Initial USEPA pHA
  - PFOA – 400 ng/L
  - PFOS – 200 ng/L
- 2016 – Revised USEPA lifetime health advisory
  - PFOA + PFOS (Combined) – 70 ng/L (ppt)
- NH first state to set limits
- Individual States
  - Connecticut – 70 ng/L (combined five compounds)
  - Massachusetts – 20 ng/L (PFOS + PFOA + PFHxS + PFHpA + PFNA **+ PFDA**)
  - Maine – task force established
  - **New Hampshire (Oct 2019) – 12 ng/L (PFOA), 15 ng/L (PFOS), 18 ng/L (PFHxS), 11 ng/L (PFNA)**
  - Vermont – 20 ng/L (combined five compounds)

EPA Order to Air Force – July 2015

- Site 8 (Fire Training Center remediation)
  - In Service Since 2018
- AIMS (Aquifer remediation)
  - In Service April 2019
- Grafton Road (drinking water)
  - GAC Filters in service since Sep 2016
  - Full System under construction



Pease PFOA/PFOS Treatment Systems:



Drinking Water Treatment Options

- Investigated other public water systems that treat PFAS
- Recommended piloting prior to any installation of new treatment

GAC Piloting – Harrison and Smith Wells: April 2016

Purpose – monitor GAC effects on pH

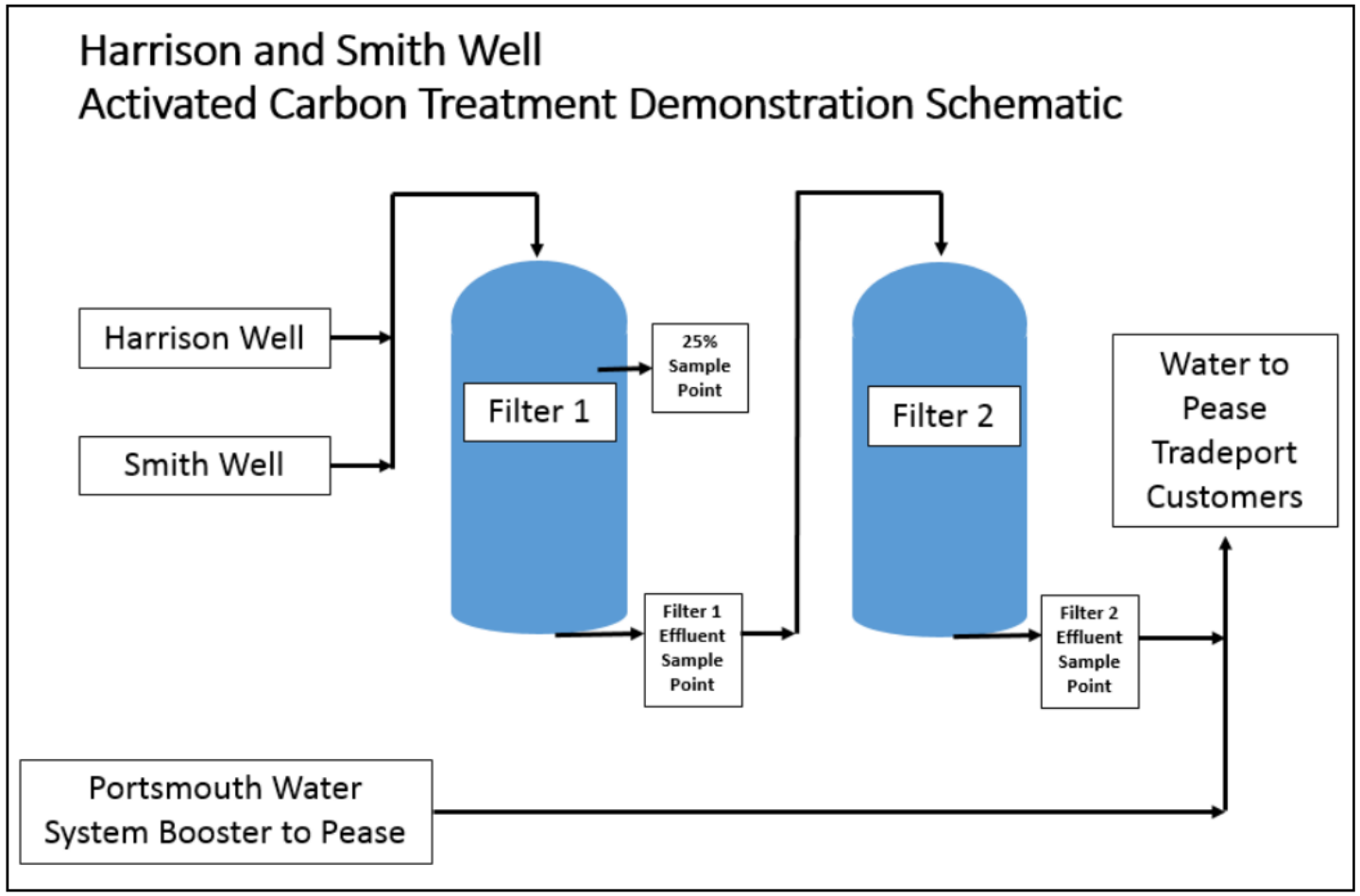
- Potential issues with orthophosphate effectiveness

Demonstration Filters: September 2016

Purpose

- Test GAC effectiveness on Pease (Harrison and Smith) water
- Continue Preliminary Design
  - Test new media
  - Further research
  - Continue negotiations

Demonstration Filter Schematic



GAC Filter Installation – September 2016

Demonstration Filter Results
(September 2016 – present)

- GAC works well for low levels of PFOA/PFOS
- Short chain compounds detected before long chain compounds
- Concentrations near detection limits are difficult to trend
  - Now using 2 ppt reporting limit

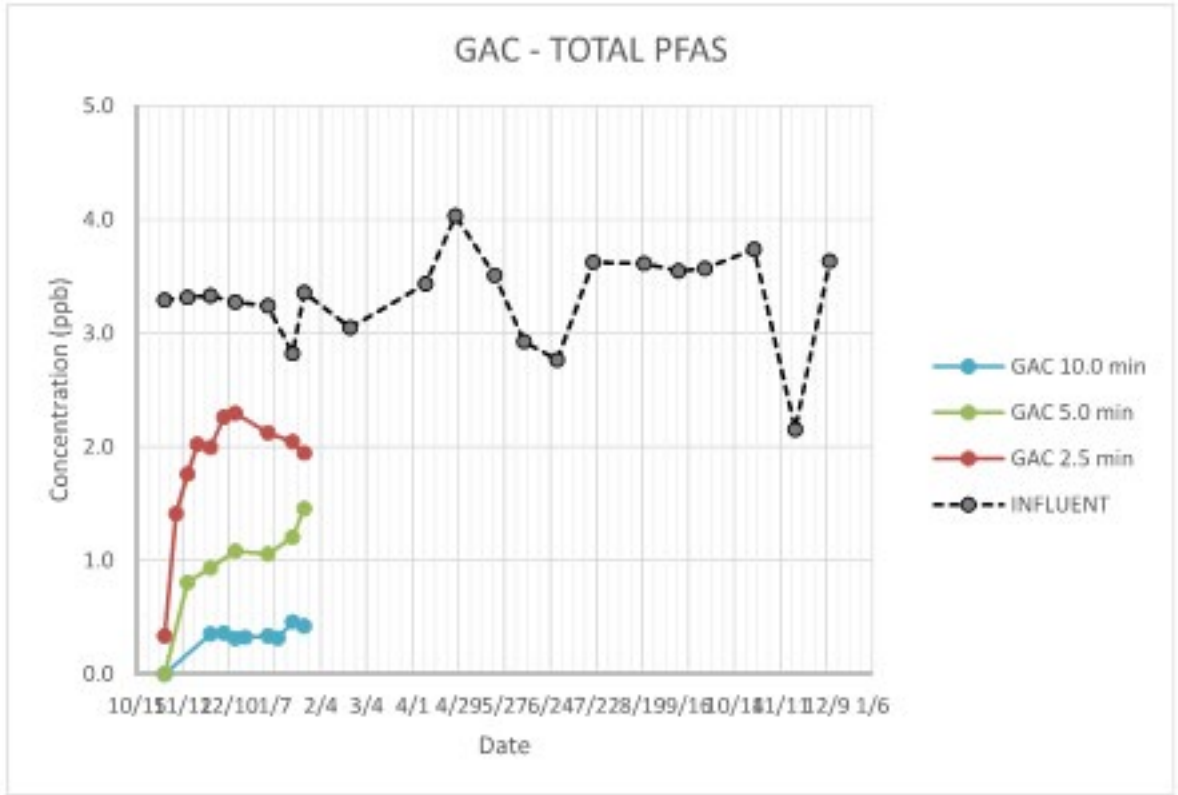
Haven Well Pilot Test – GAC and Resin October 2017

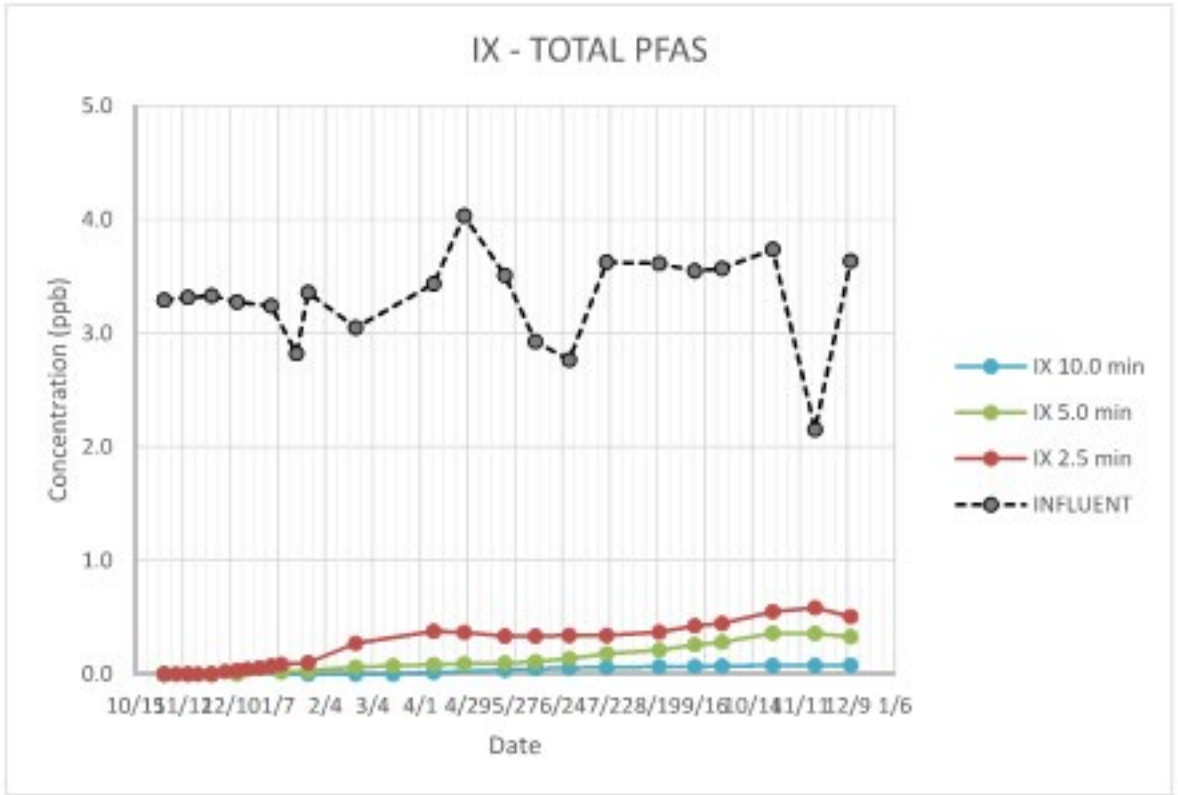
- Uncertain if GAC would perform well for significantly higher levels of PFAS.
- Compare the ability of media to remove PFAS from the Haven Well
  - IX Resin = ECT's SORBIX LC1
  - GAC = Calgon's F400
- Confirm design parameters and system sizing to be used in the preparation of the full-scale treatment system technology evaluation.
- Select PFAS-removal technology for full-scale implementation based on lifecycle cost comparison and risk

Haven Pilot Setup

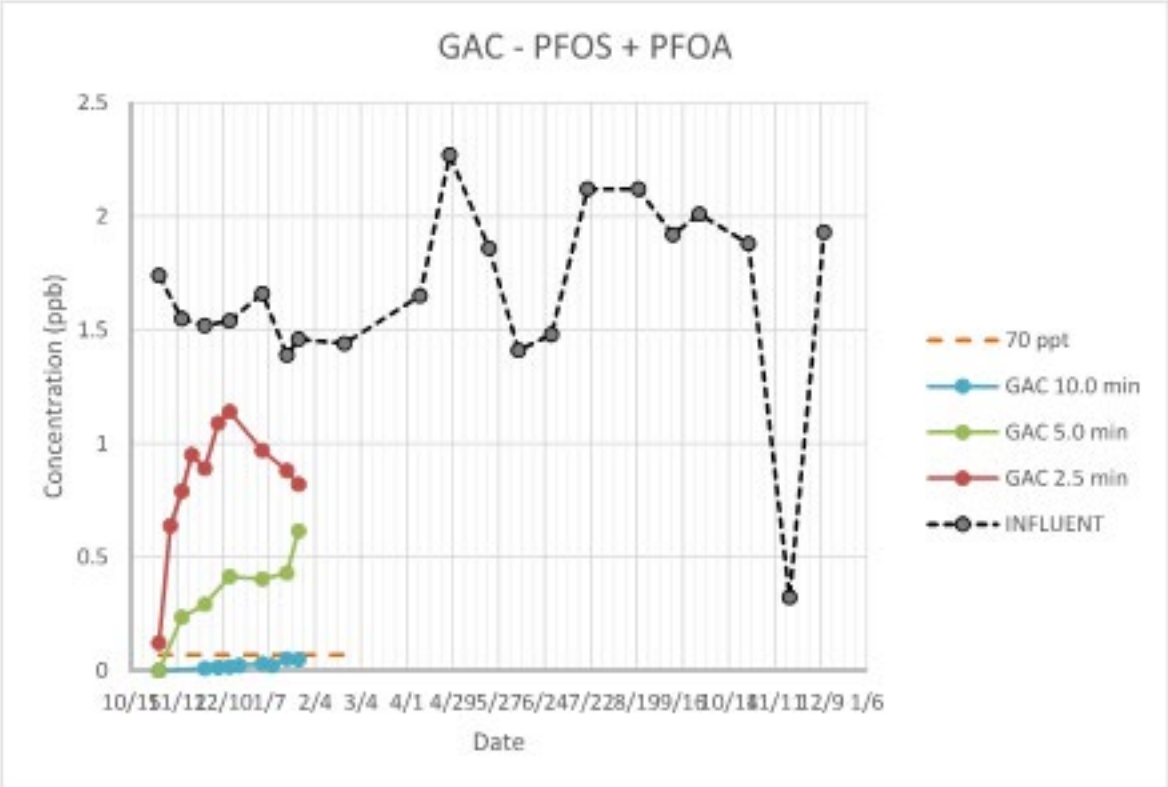
- Fabricated dual sided pilot skid for side-by-side testing: IX Resin vs. GAC
  - Each side:
    - Design flowrate of 112 gpd
    - 4 columns in series, 2.5-min EBCT each
    - 1.25-inch column diameter
    - 30-inch media bed height
- Sampled & analyzed for 23 PFAS compounds out of each column

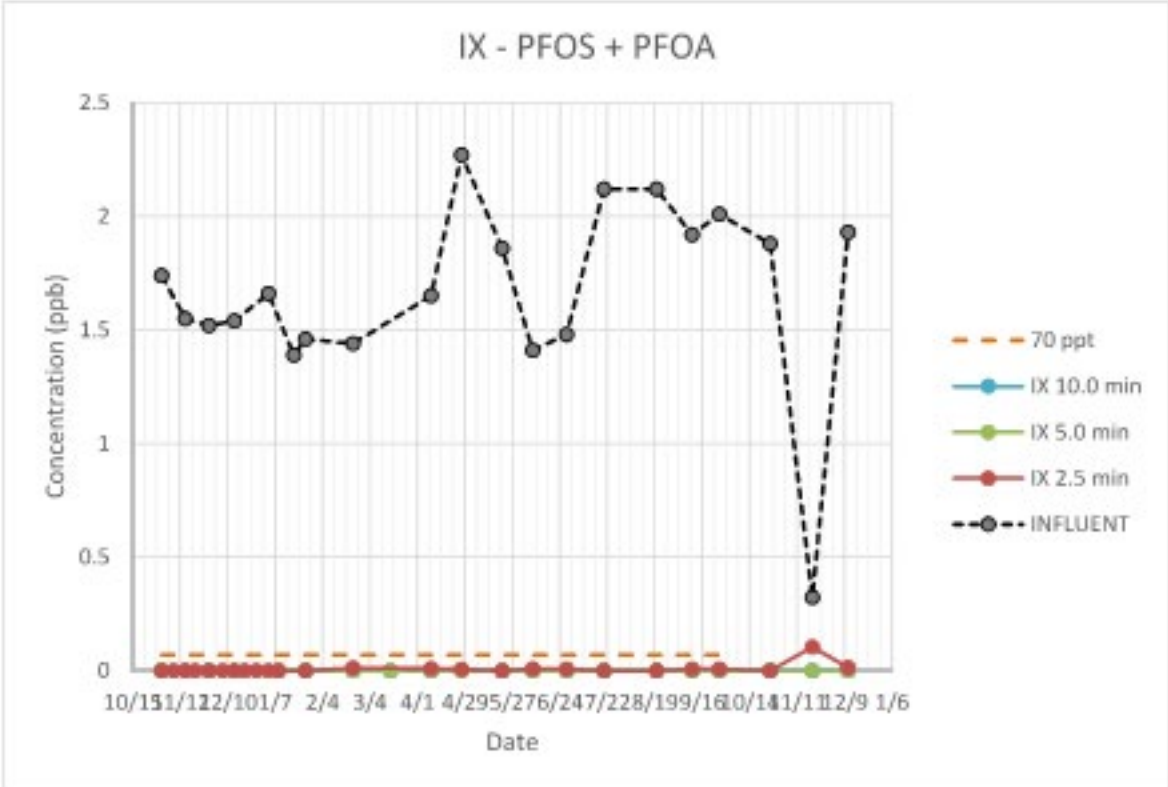
Haven Pilot Results





Haven Pilot Results

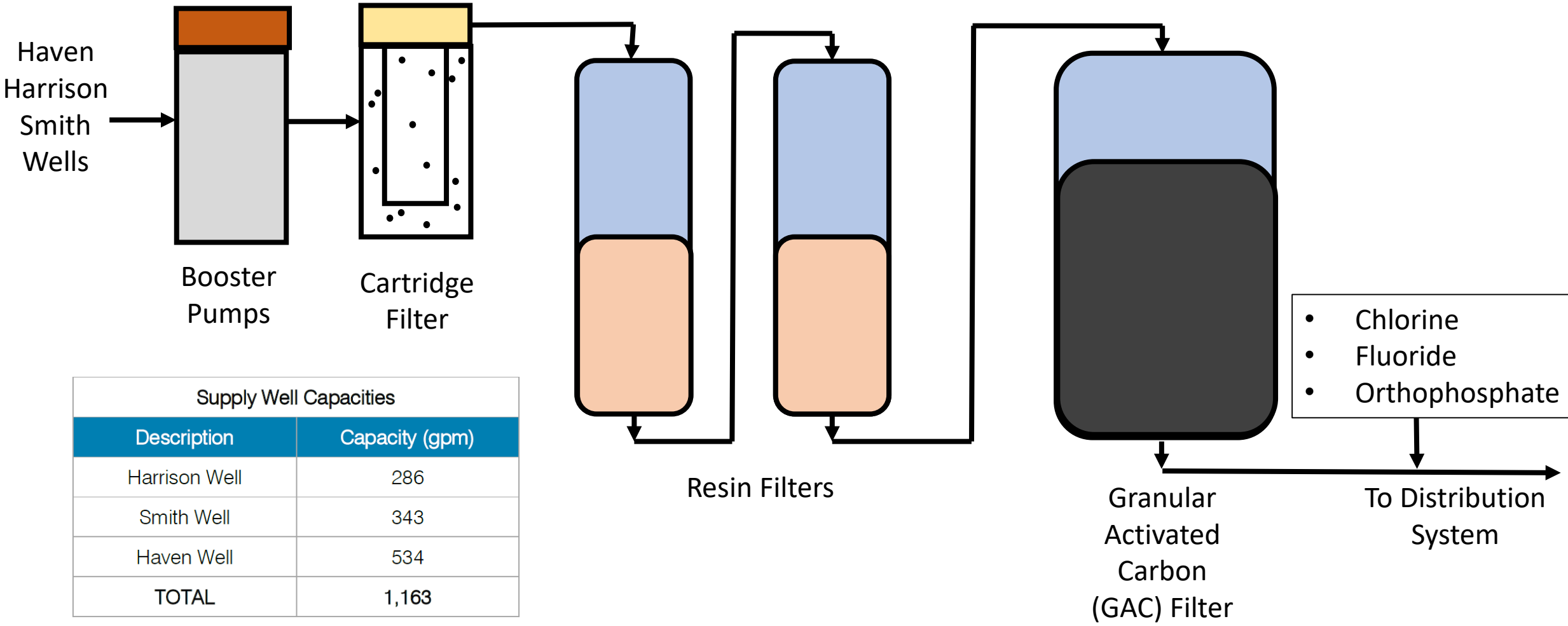




Haven Pilot Conclusions

- Resin outperforms GAC when raw water PFAS concentrations are high
- Resin removed short chain compounds better than GAC
- As regulations move PFAS limits lower, the advantages of resin over GAC goes up

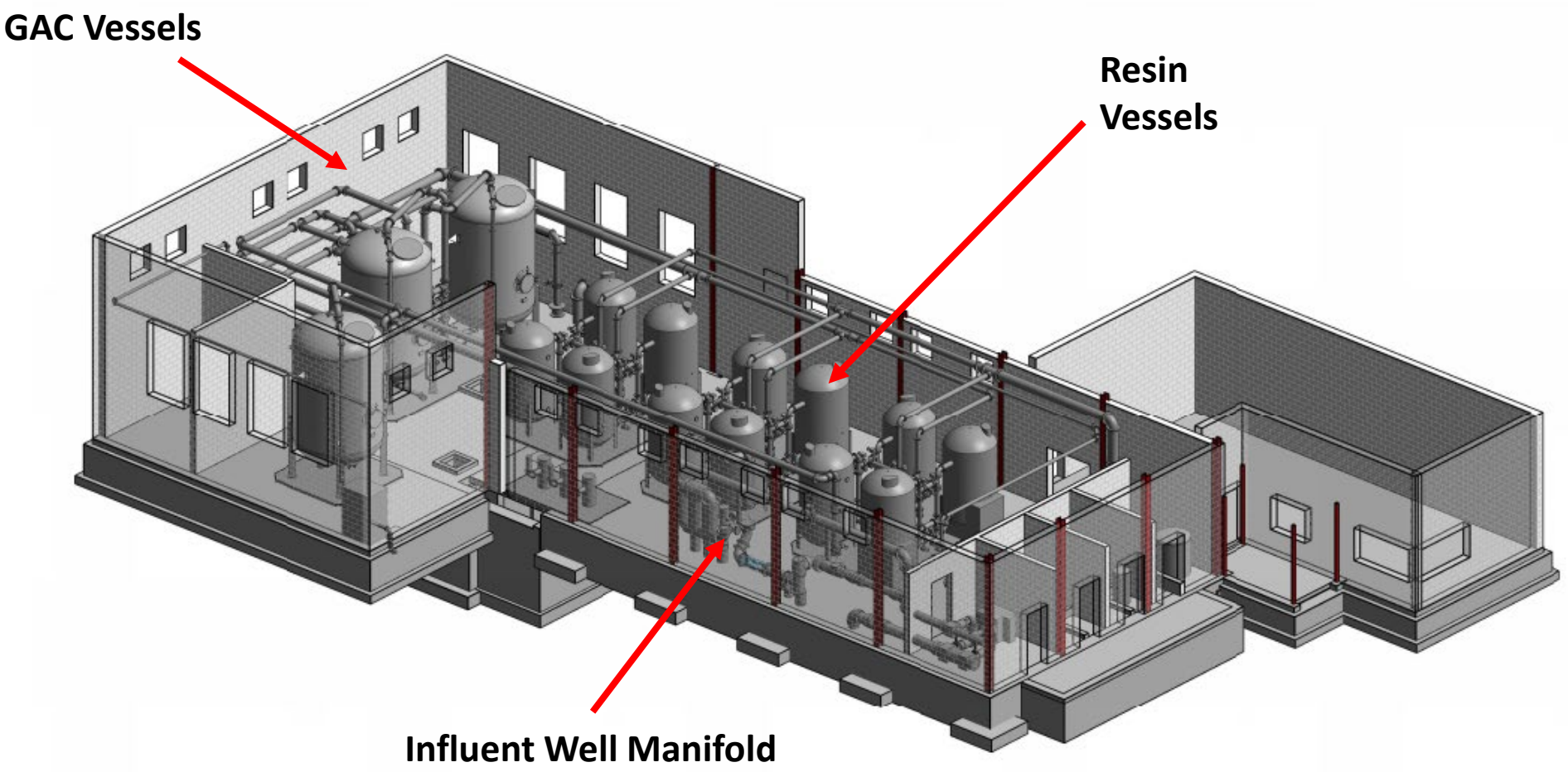
Grafton Road Water Facility Process Schematic
Current Treatment System Design



Supply Well Capacities	
Description	Capacity (gpm)
Harrison Well	286
Smith Well	343
Haven Well	534
TOTAL	1,163

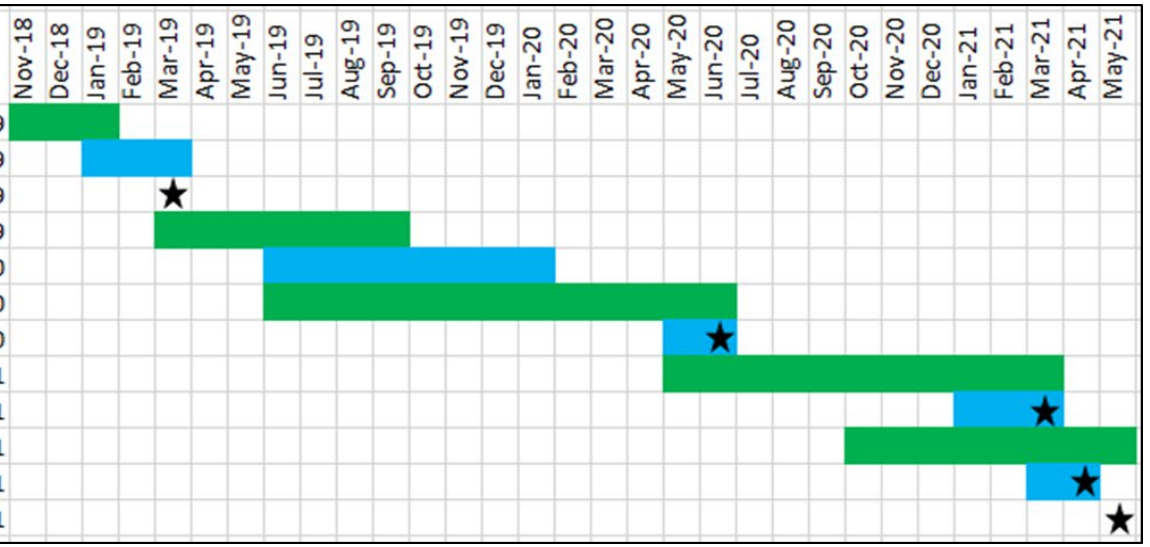
Current Rendering – Grafton Road Water Treatment Facility

Proposed Final Layout



Construction:

Activity	Duration	Start	Finish
Bidding	61	11/15/2018	1/15/2019
Contract Award	56	1/15/2019	3/12/2019
Notice to Proceed	0	3/12/2019	3/12/2019
Submittals	181	3/13/2019	9/10/2019
Equipment Procurement	224	6/4/2019	1/14/2020
Phase 1 - Building Addition & GAC Filters	379	6/10/2019	6/23/2020
GAC Filters On-Line with Smith & Harrison	27	5/27/2020	6/23/2020
Phase 2 - Resin Skid, Cartridge Filters, Booster Pumps	279	5/29/2020	3/4/2021
Full System Start-Up with Smith & Harrison	48	1/15/2021	3/4/2021
Phase 3 - Admin Area, Site Work, Haven Well Online	200	10/15/2020	5/3/2021
Full System Start-Up with Haven	42	3/4/2021	4/15/2021
Final Completion	4	4/29/2021	5/3/2021

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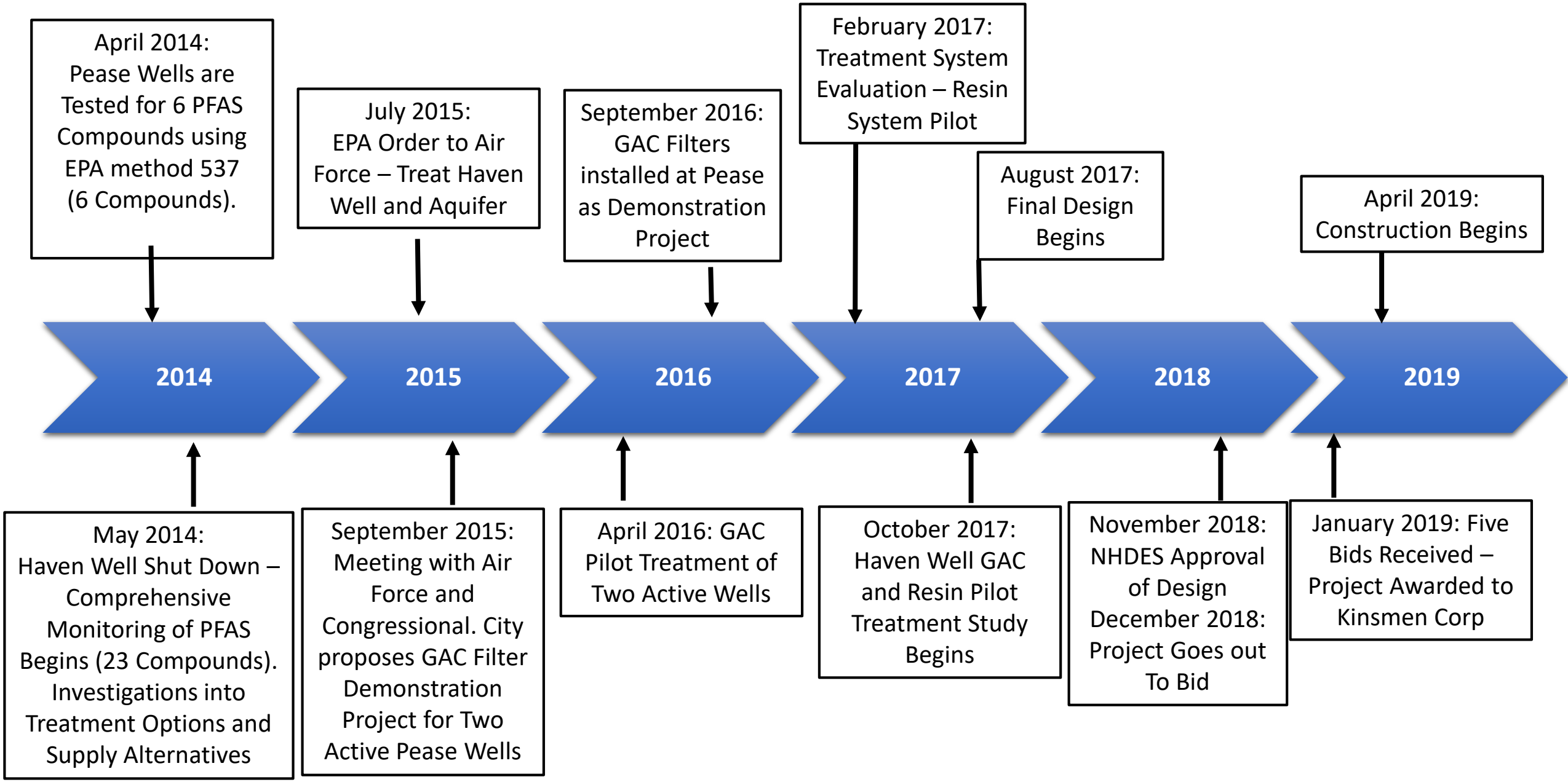
Sharing Lessons Learned:

New Hampshire Water Works Association's Construction Field Day – Aug 2019

PEASE TRADEPORT PFAS TIMELINE



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