



wood.

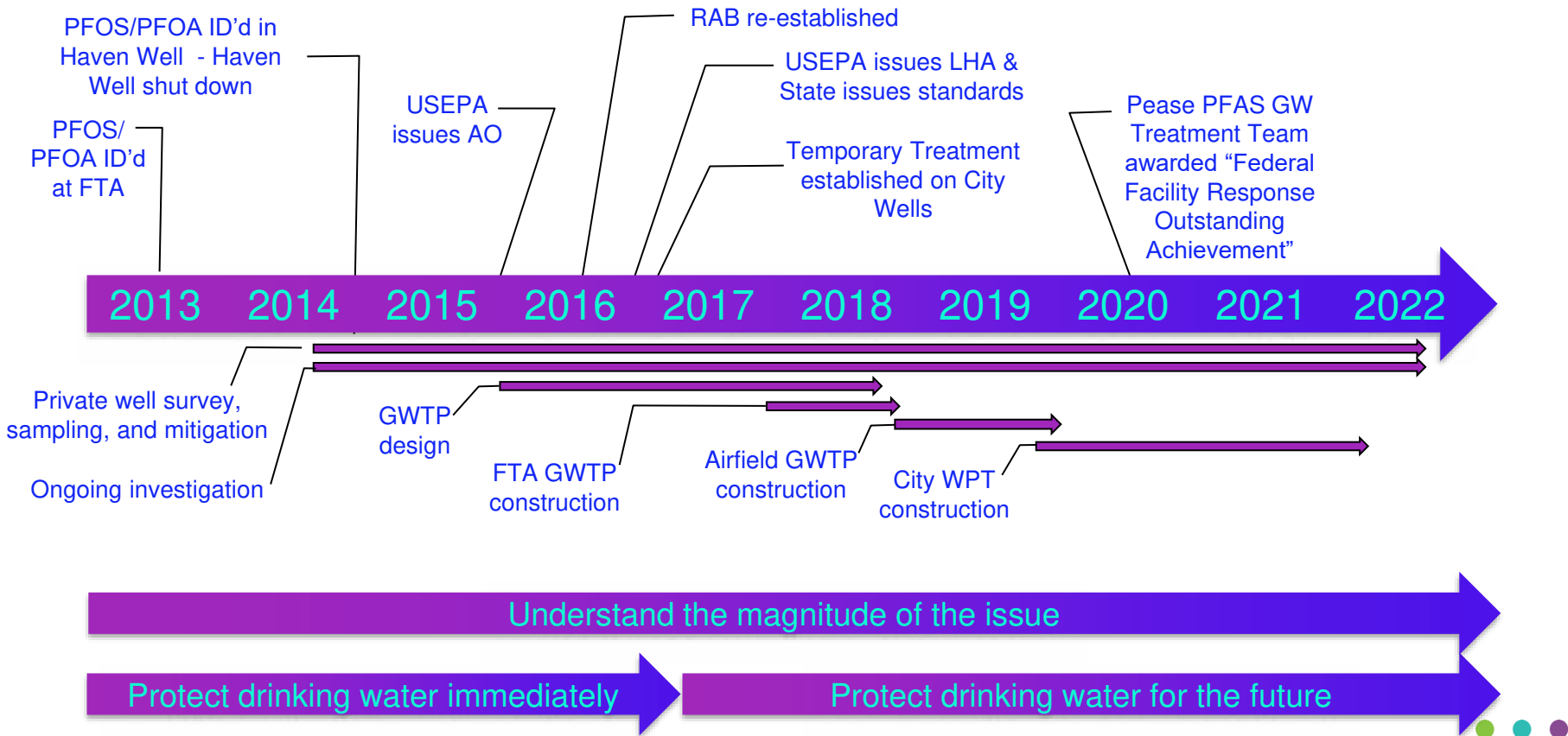
Weston & SampsonSM

Deploying a “Three-Legged-Stool” Approach to Drinking Water Protection for PFAS

Presented by: Rob Singer, PE – Wood E&IA
Blake Martin – Weston & Sampson

November 2021

The Timeline



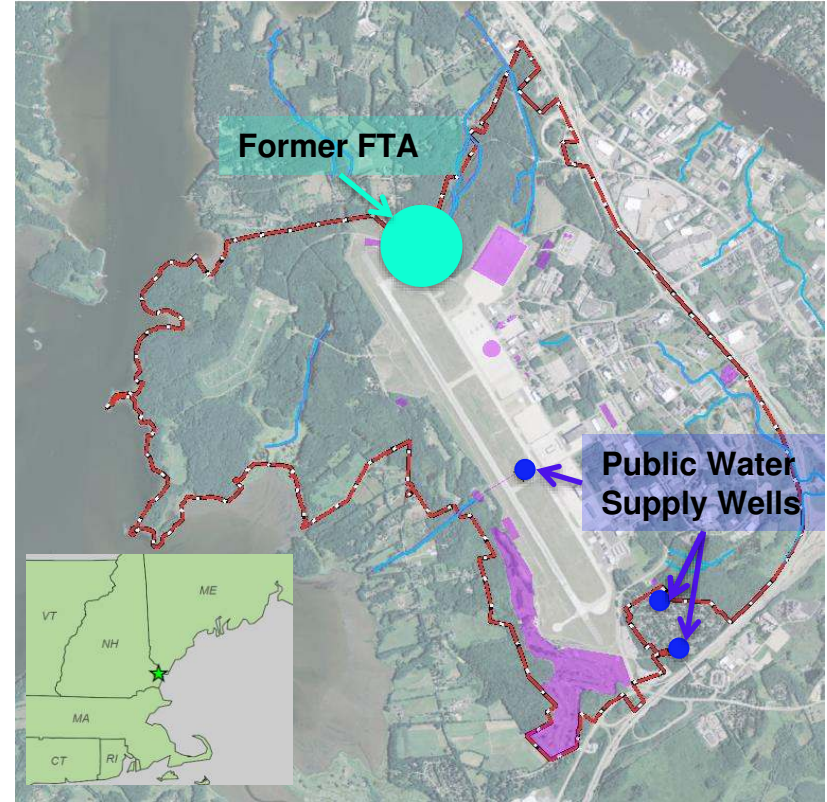
The Three-Legged Stool



History of PFOS/PFOA Discovery at Pease

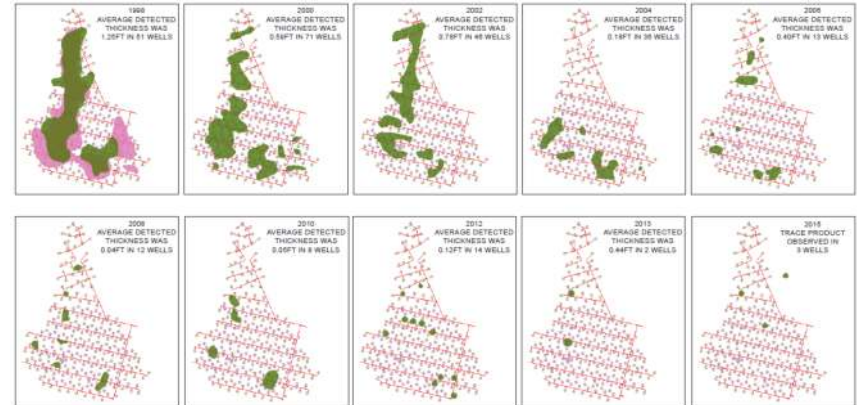
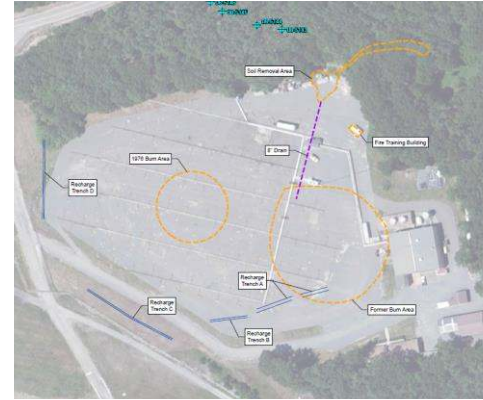
Fire Training Area History

- Used from 1961 through 1988, AFFF introduced ca. 1970-1974
- Burned fuels and used water and fire fighting foam to extinguish the fires
- Fire training exercises resulted in fuel and solvent environmental contamination to soil, groundwater and springs
 - PFOS/PFOA were not considered contaminants of concern at that time.
- The Air Force began investigating and cleaning up fuel and solvents in soil, groundwater and springs in 1984

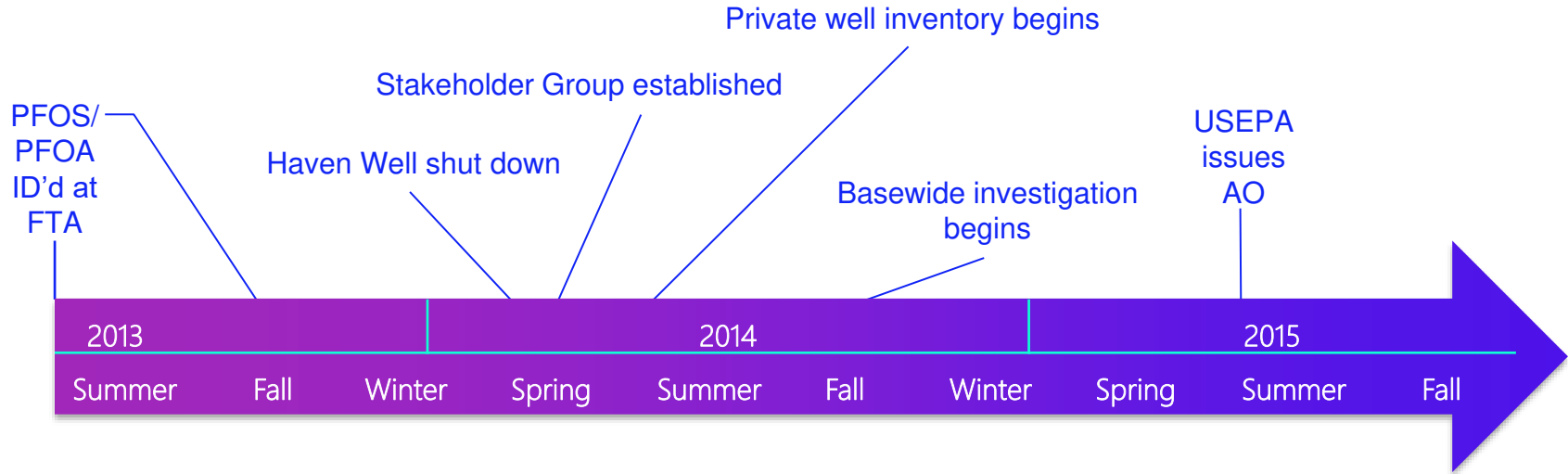


Fire Training Area History

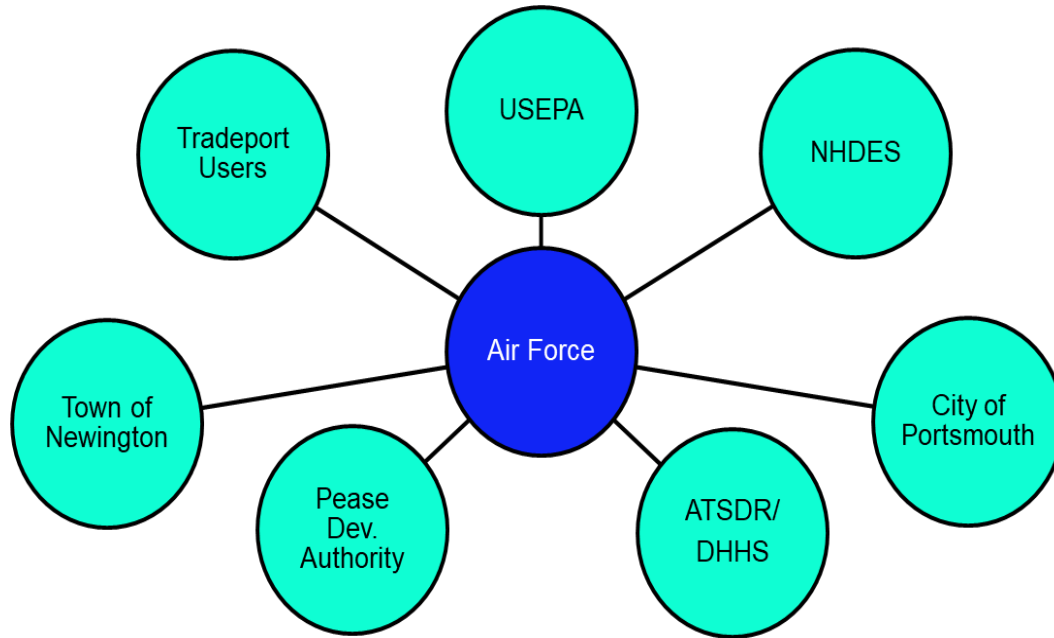
- Fuel and solvent cleanup has been very successful - over 330,000 pounds of contamination removed
- SVE/AS systems were shut down in 2013 because objectives were met
- The Air Force was working on final “polishing” of this site when PFOS and PFOA were identified



PFOS/PFOA Discovery and Initial Response



Stakeholders



- Lack of Federal or State criteria
- Regulators and City under intense public pressure
- Private property access agreements required for many of the further actions
- City has water capacity concerns

Developing the Protection Plan

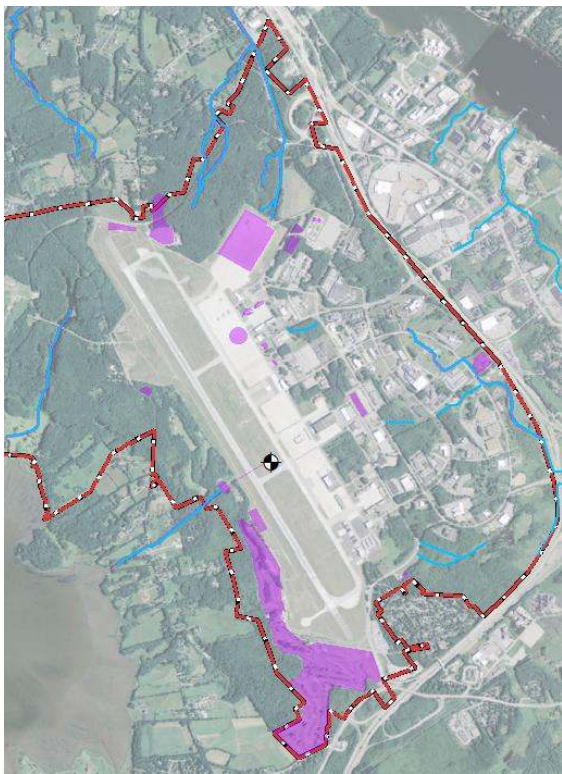
Protect drinking water immediately



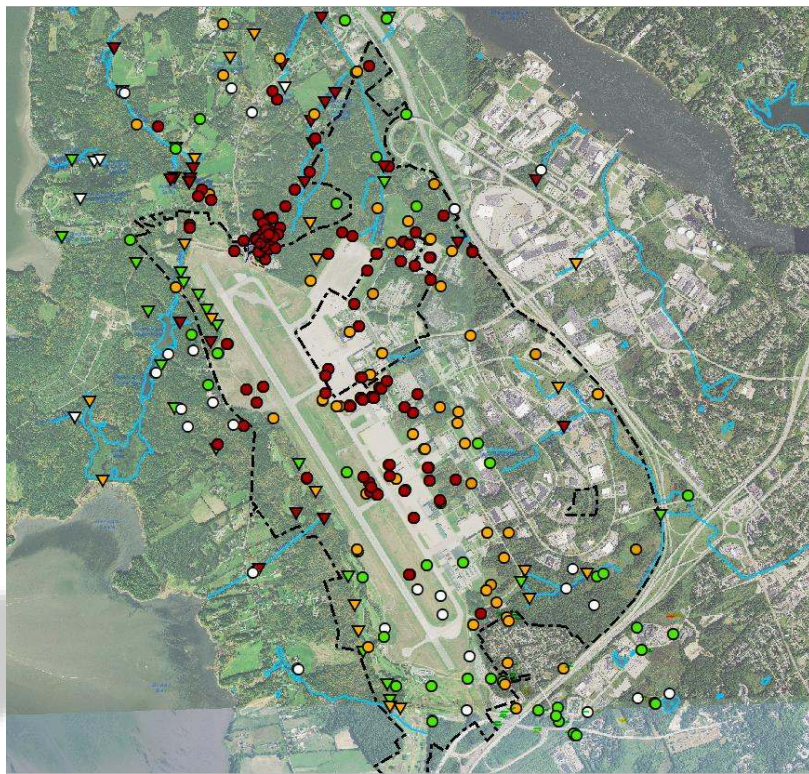
Courtesy of the City of Portsmouth



Understand the magnitude of the issue



April 2014



August 2021



Protect drinking water in the future

Define treatment objectives

- Treat drinking water > LHA
- Control plume migration towards drinking water wells
- Contribute to aquifer restoration

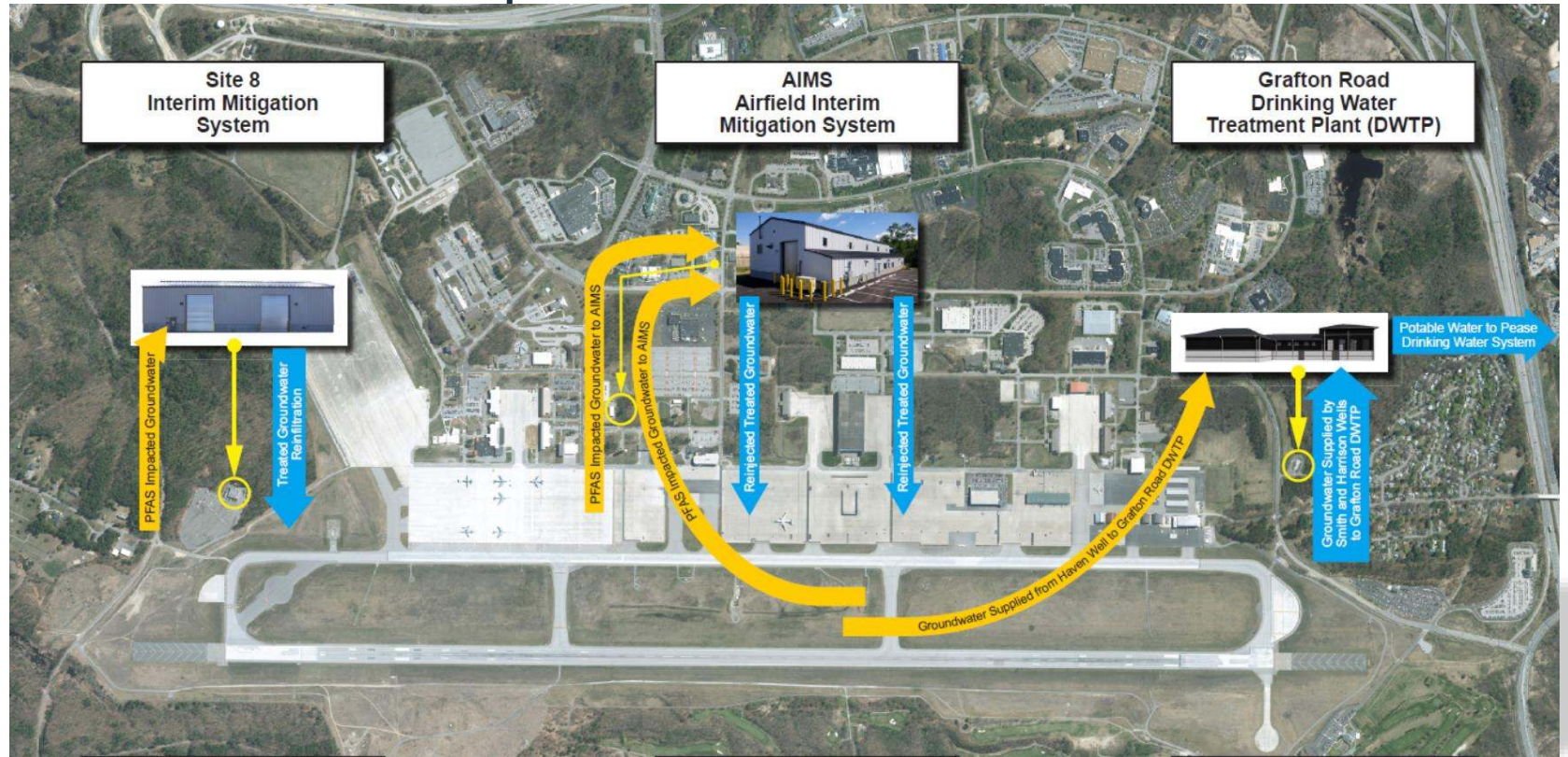
Develop design criteria

- Aquifer testing and modeling
- Influent water quality
- Site selection

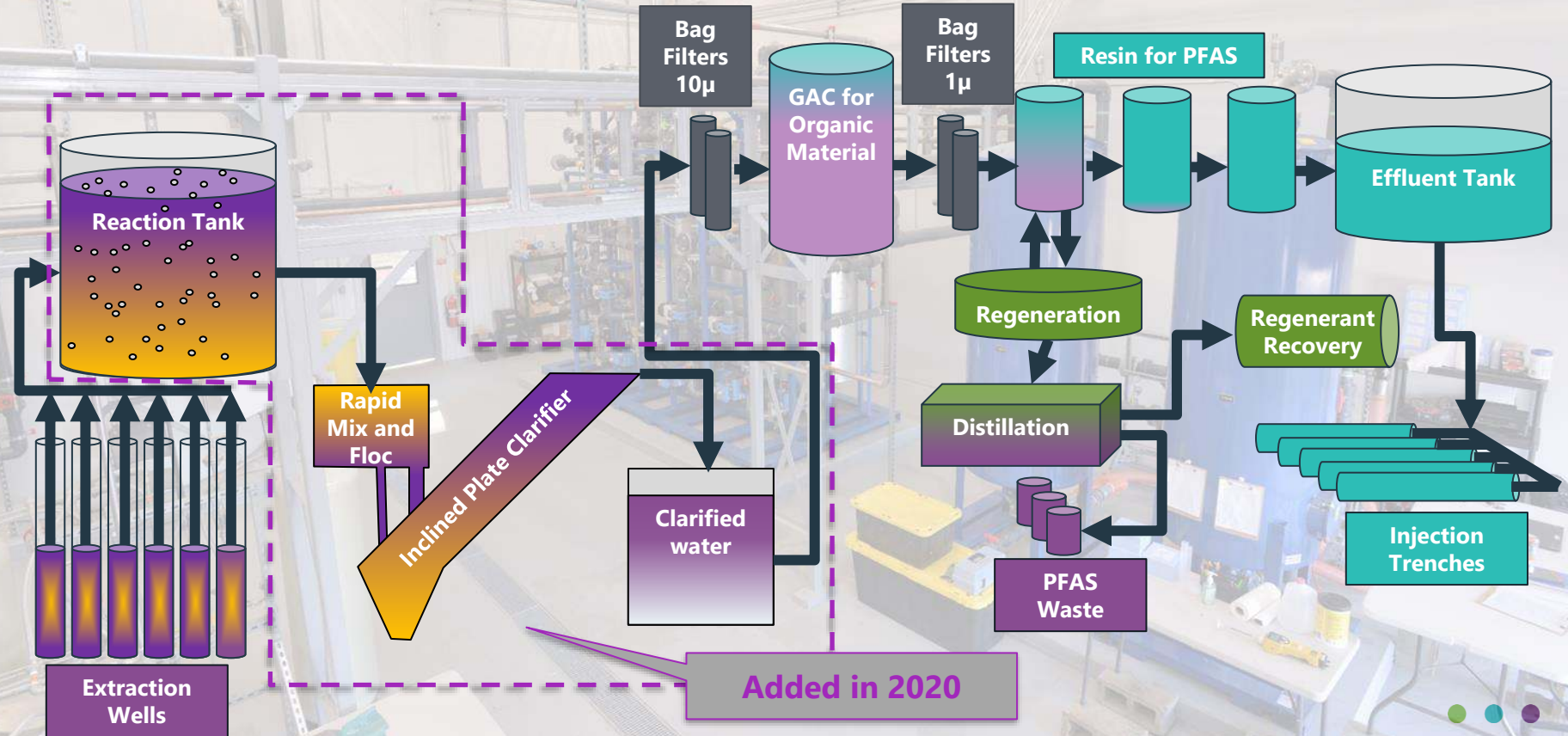
Evaluate technologies

- GAC
- Single-use IX Resin
- Regenerable IX resin

Three-Part Concept

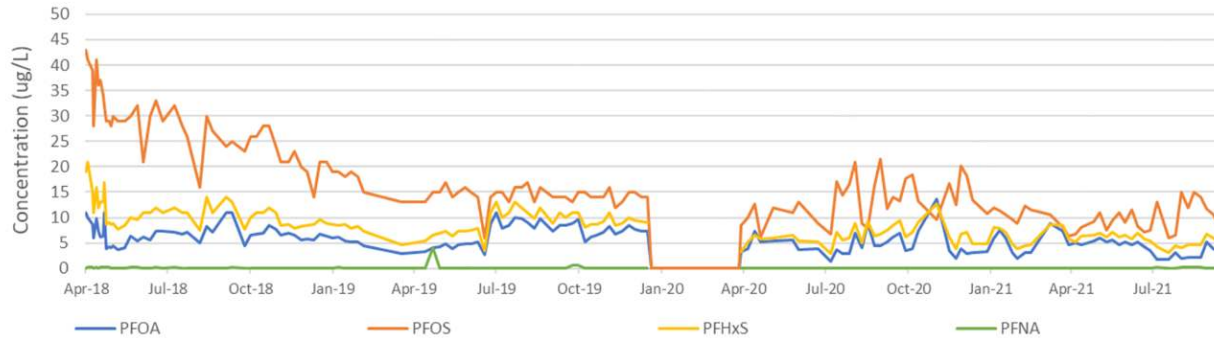


Site 8 Interim Mitigation System (IMS)

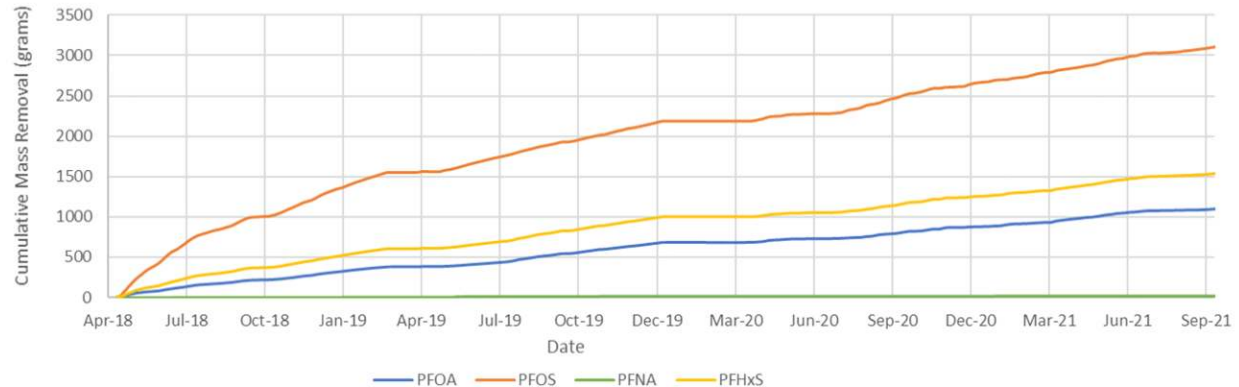


Site 8 Interim Mitigation System

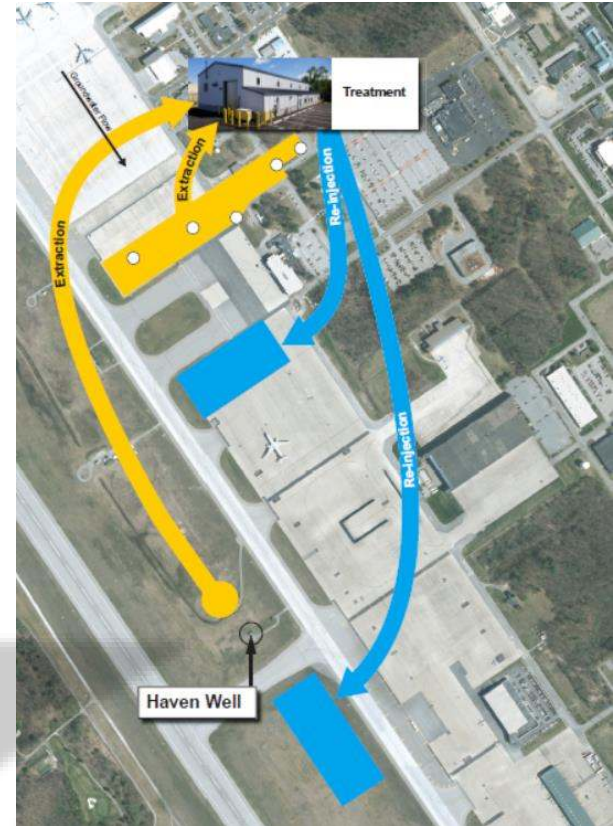
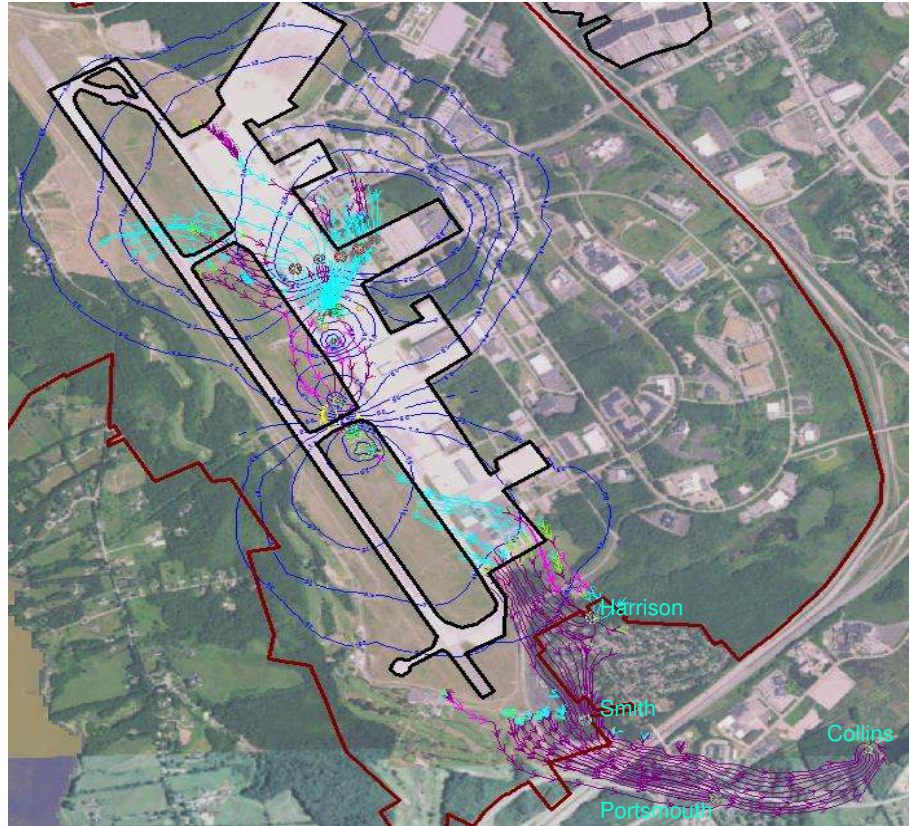
Site 8 Combined Influent



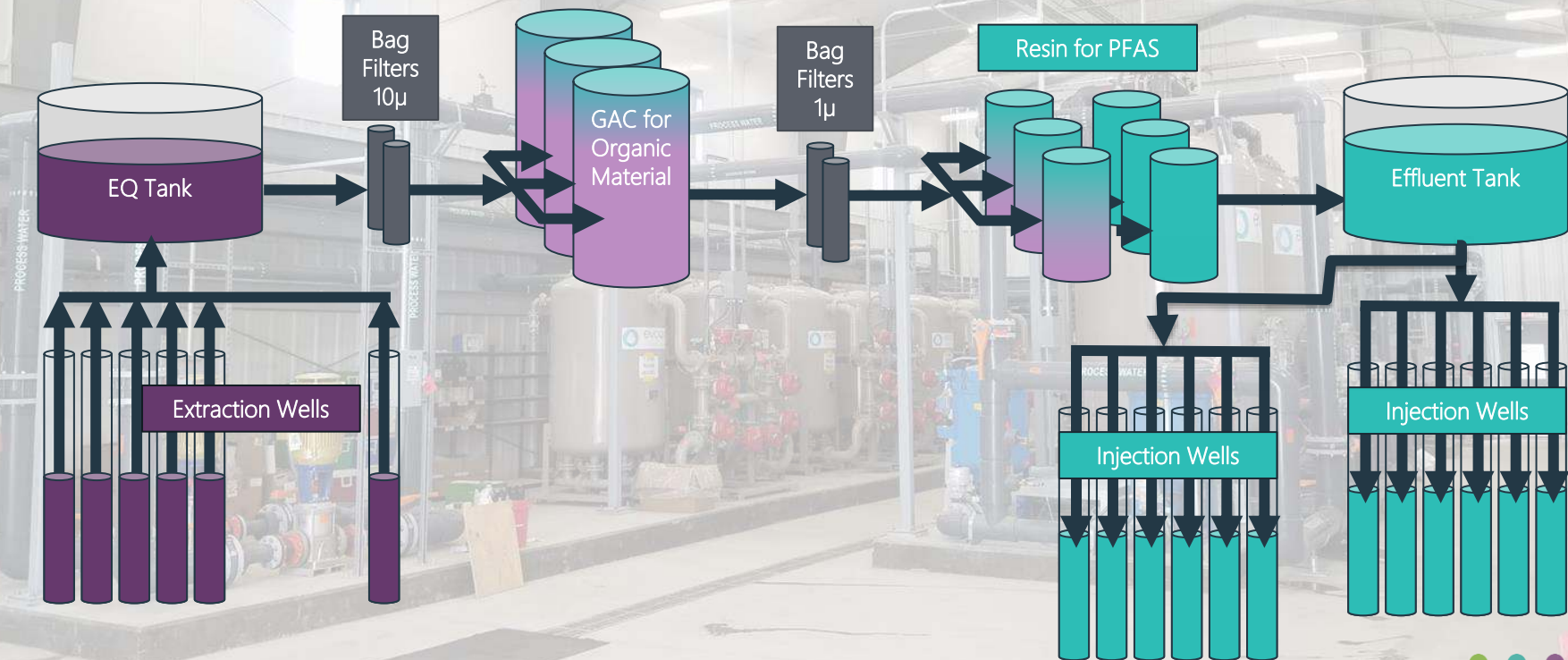
Site 8 IMS Cumulative Mass Removals



Airfield Interim Mitigation System

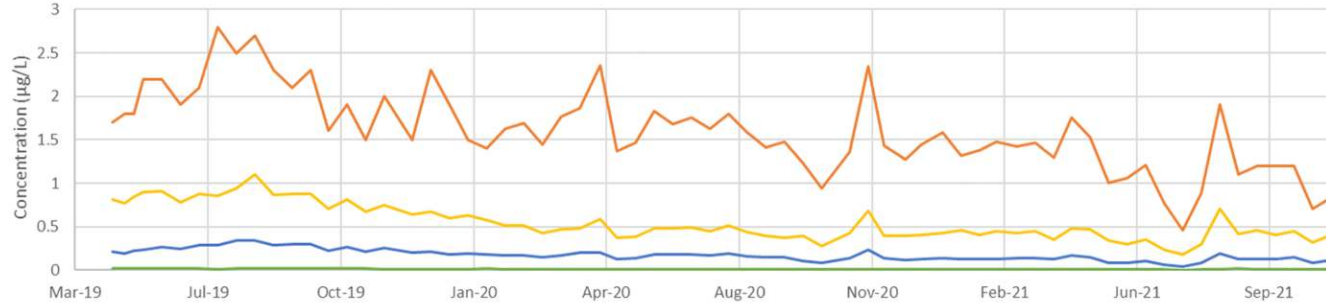


Airfield Interim Mitigation System

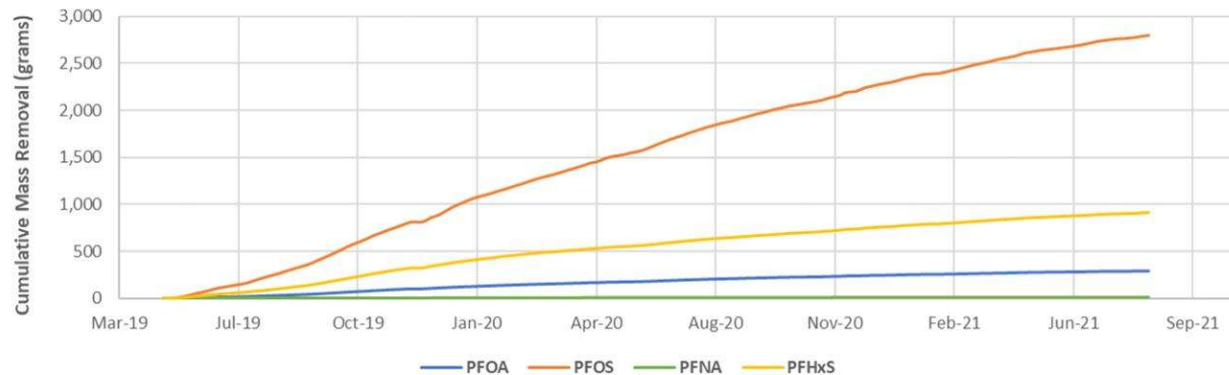


Airfield Interim Mitigation System

AIMS Combined Influent



AIMS Cumulative Mass Removals



City of Portsmouth Keeps the Water Flowing During Major Treatment Plant Upgrade

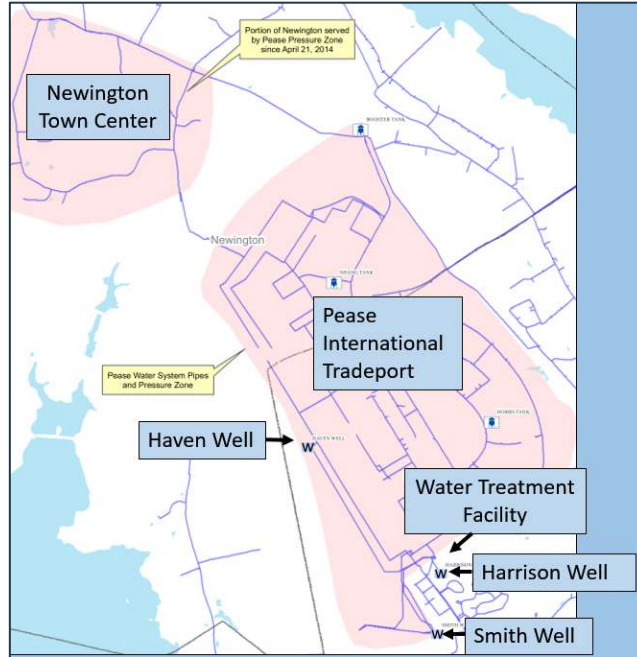
Brian Goetz – City of Portsmouth

Al Pratt – City of Portsmouth



Pease International Tradeport

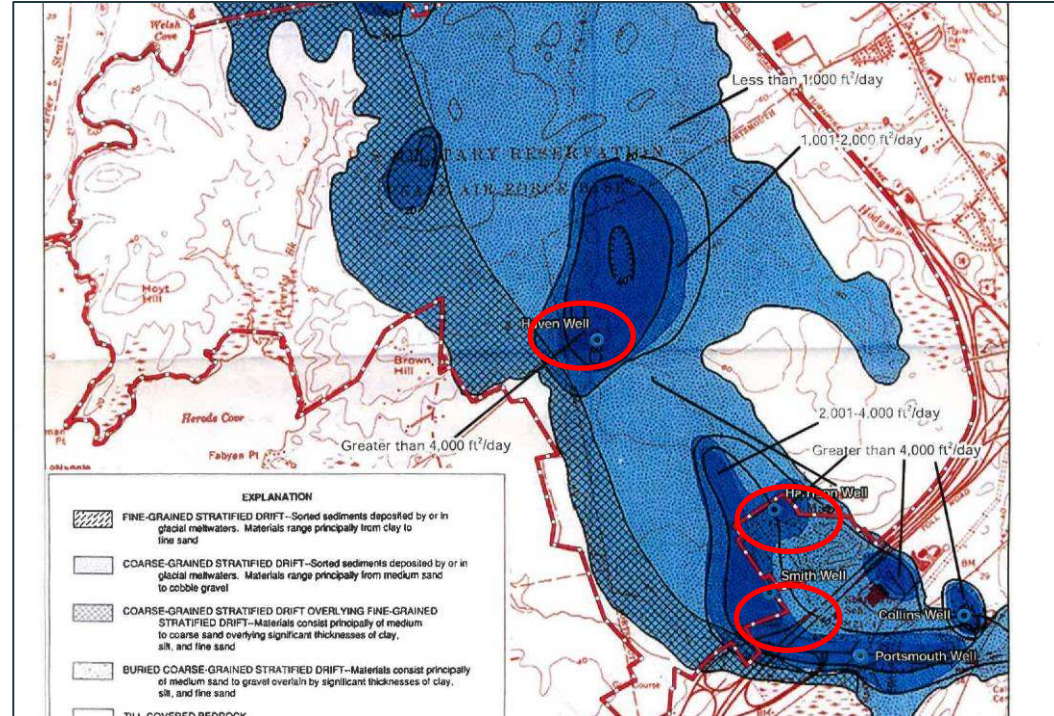
Drinking Water System



Drinking Water Sources

Well	Flow Rate (gpm)	PFOA+PFOS (ng/L)
Harrison	286	29
Smith	343	12
Haven	534	1,495-2,600

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



Haven Well

- 1875 - Installed at Haven Springs
 - A Primary Water Supply Source for the City of Portsmouth
- 1956 to 1992 – Served Pease Air Base
- 1992 – Turned back over to Pease Development Authority / Portsmouth
- May 2014 - Taken out of Service due to exceedance of PFOS Preliminary Health Advisory



EPA Order to Treat Haven Well Water August 2015

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I**

In the Matter of:)	
)	
United States Air Force,)	Docket No.: SDWA-01-2015-0061
)	
Respondent.)	
)	
Former Pease Air Force Base,)	
)	
The "Facility")	
)	
)	
)	
)	
)	ADMINISTRATIVE ORDER
)	FOR RESPONSE ACTION
)	
Proceeding Under Section 1431(a) of the)	
Safe Drinking Water Act,)	
42 U.S.C. § 300i(a))	

- Required Treatment System for Haven Well
- City signed agreement with Air Force to design and construct the system
- Air Force agreed to system that would also treat Harrison and Smith Wells

Local and Federal Legislative Delegation



2016 – Governor (now Senator) Hassan meets with Testing for Pease representatives

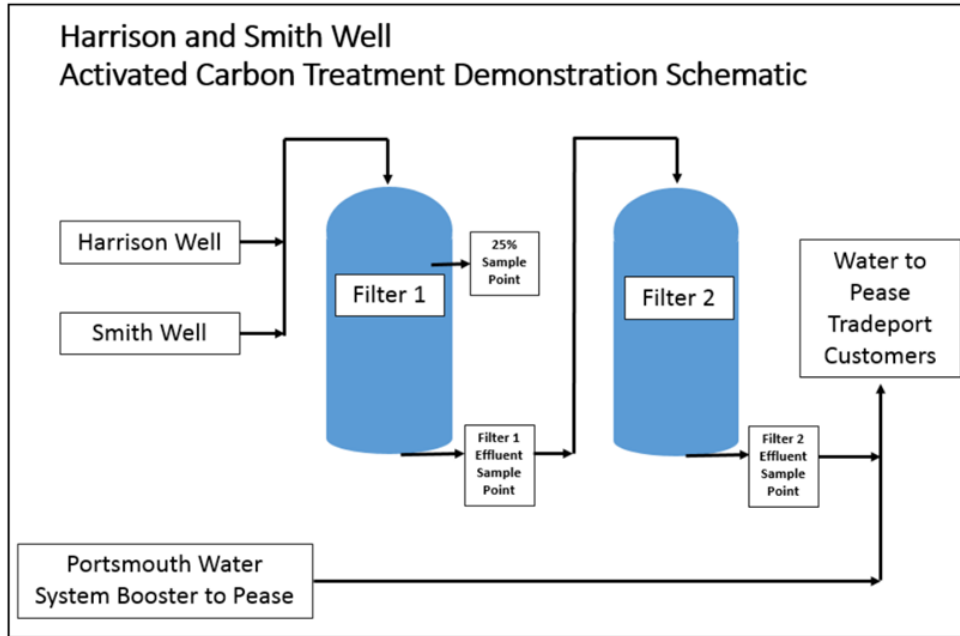
Both have advocated for treatment of wells and blood testing/health studies

Evaluation of Treatment Options



- Spring 2016 – Pilot GAC filtration
- Fall 2016 – Install full size temporary GAC filtration, referred to as a demonstration study
- 2016-2018 - Nationwide review of other drinking water systems

Demonstration Filter Schematic



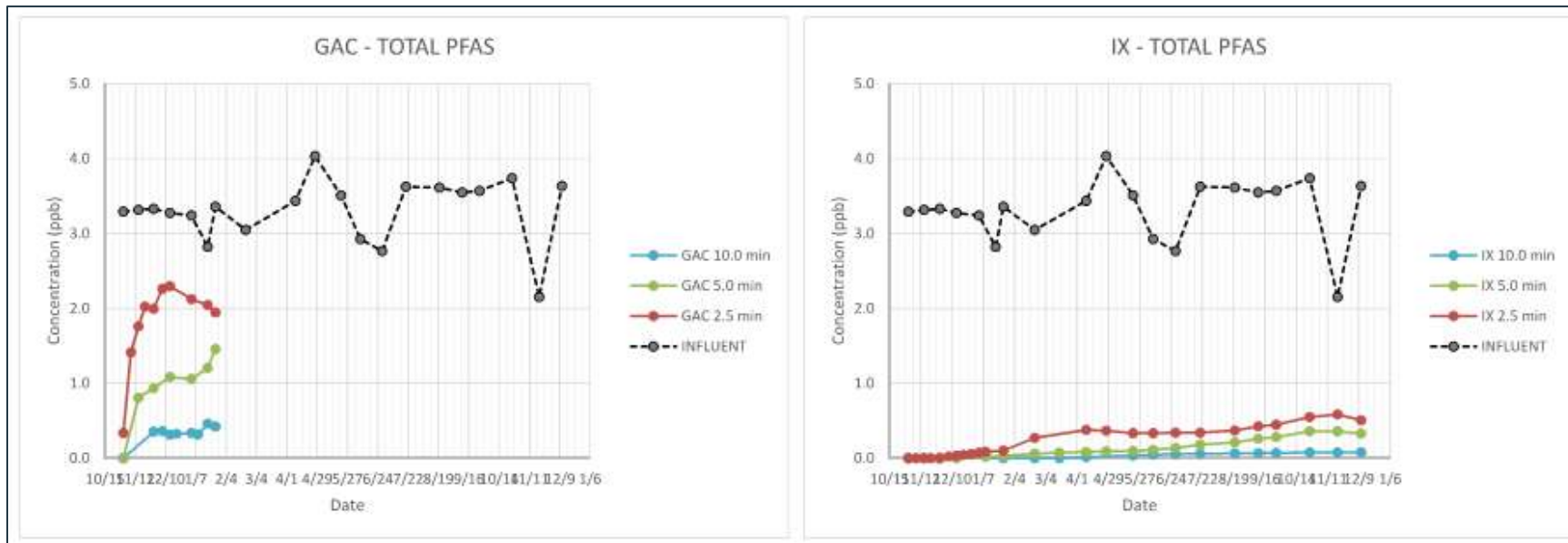
Objectives of Haven Well Pilot Test

(November 2017 – December 2018)



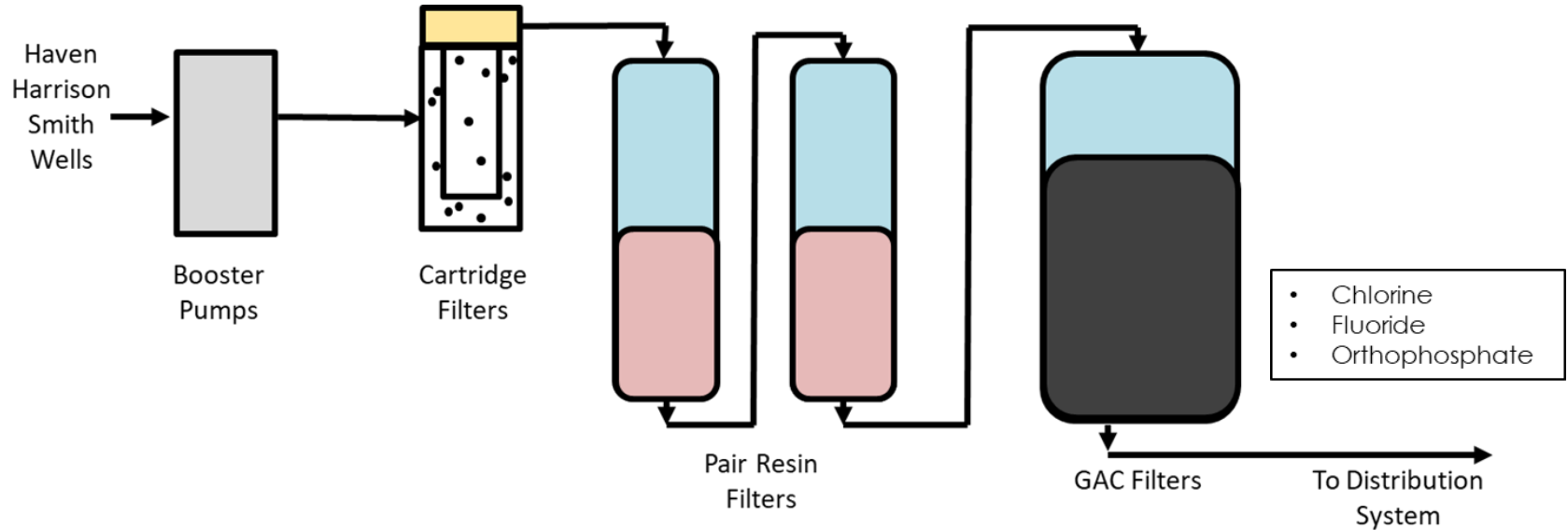
- Uncertain if GAC would perform well for significantly higher levels of PFAS.
- Compare the ability of media to remove PFAS from the Haven Well
 - IX Resin = ECT2's SORBIX LC1
 - GAC = Calgon's F400

Haven Pilot Results

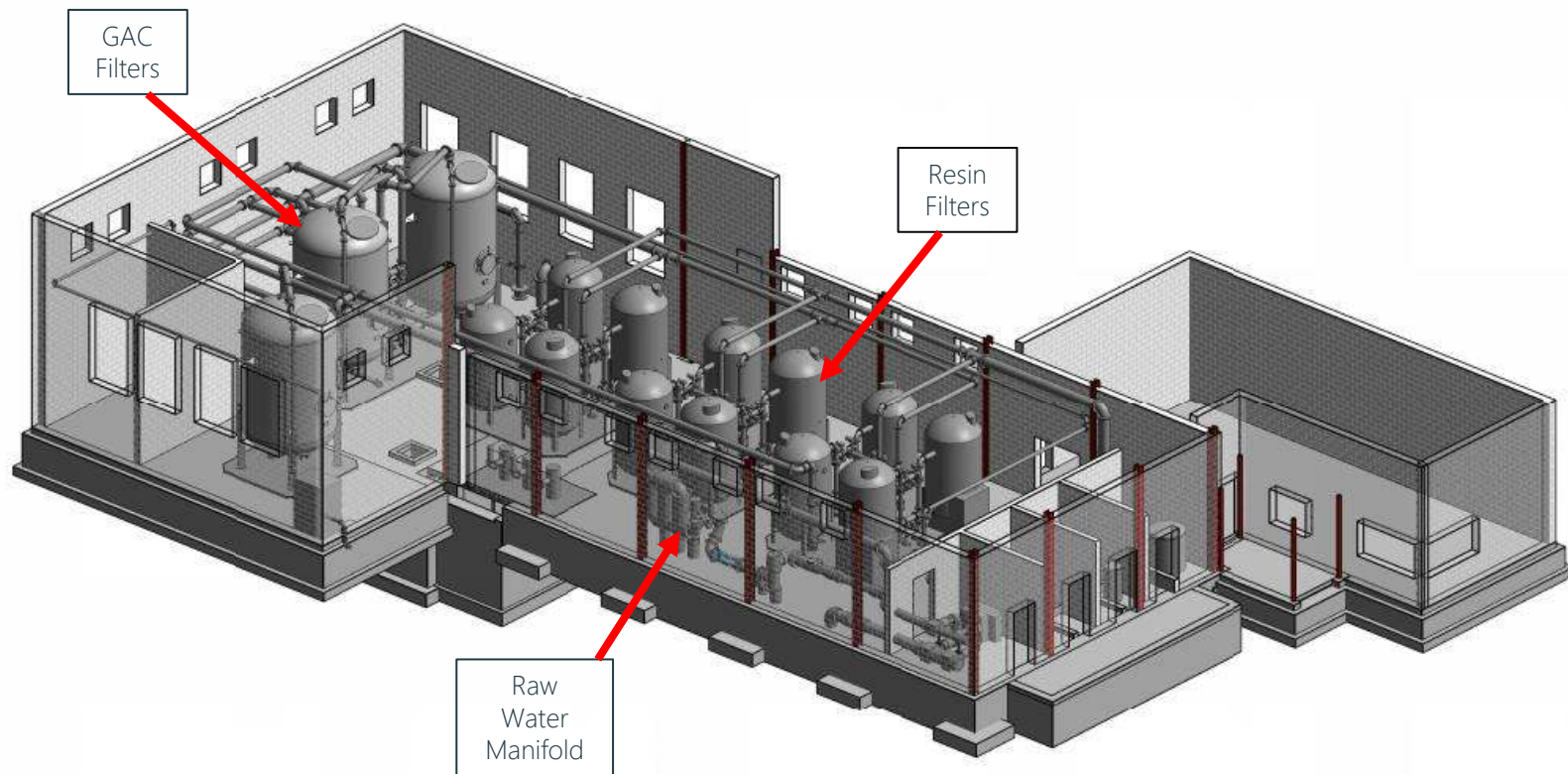


Pease WTF Process Schematic

New Treatment System



Final Treatment Layout



Final Rendering



Rendering Comparison



Building Construction – October 2020



Two Years of Construction

April 2018



April 2020



October 2019 – GAC Filter Installation



June 2020 - Demolition of Existing Building



March 2021 – New Well Manifold Installation



Haven Well PFAS Sample Results

PFAS Sampling (New Hampshire Regulated Compounds)	2014 (Ave of 2 Samples) PPT	2021 (Ave of 3 Samples) PPT
Perfluorohexanesulfonic Acid (PFHxS)	895	129
Perfluorooctanoic Acid (PFOA)	341	47
Perfluorononanoic Acid (PFNA)	17	4
Perfluorooctanesulfonic Acid (PFOS)	2,450	427

* PPT = Parts per Trillion

Significant drop in levels from 2014



May 4, 2021 Dedication



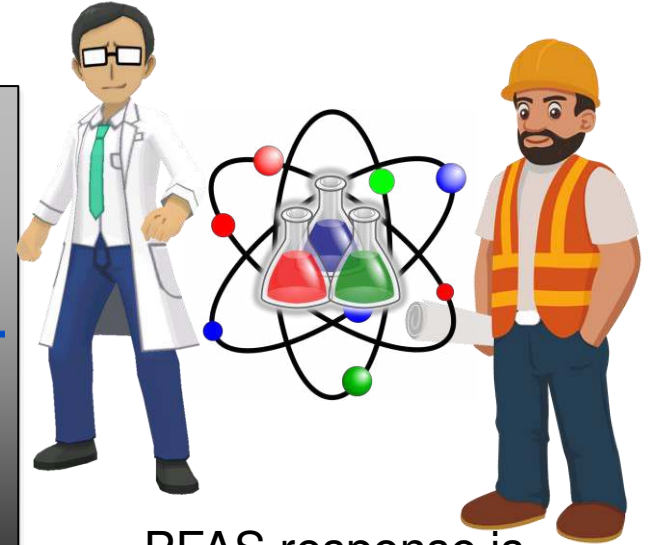
Project Team...Thanks!

- Water Operations and City Staff
- Weston & Sampson
- Pease Development Authority
- Air Force Civil Engineering Center
- Wood PLC
- New Hampshire DES
- EPA Region 1



Takeaways

Frequent and consistent communication and coordination is key to success



PFAS response is not just a technical challenge