TREATMENT PLAN FOR PEASE TRADEPORT WATER SUPPLY

*** Presented to Pease Restoration Advisory Board during July 14, 2016 Site Visit ***

In April, 2016 the City of Portsmouth, the Pease Development Authority (PDA) and the United States Air Force announced the execution of an agreement to enable an upgrade of the Pease Tradeport water treatment system in order to install carbon filters to remove PFCs from water supplied by the Smith, Harrison and Haven Wells. Through this agreement, the City is moving forward with the installation of carbon filters for the Harrison and Smith wells, and subsequent design of treatment for the Haven Well. Treatment of all the wells has been a goal of the City since the contamination was first discovered and was requested directly of the Air Force through correspondence beginning in June 2014.

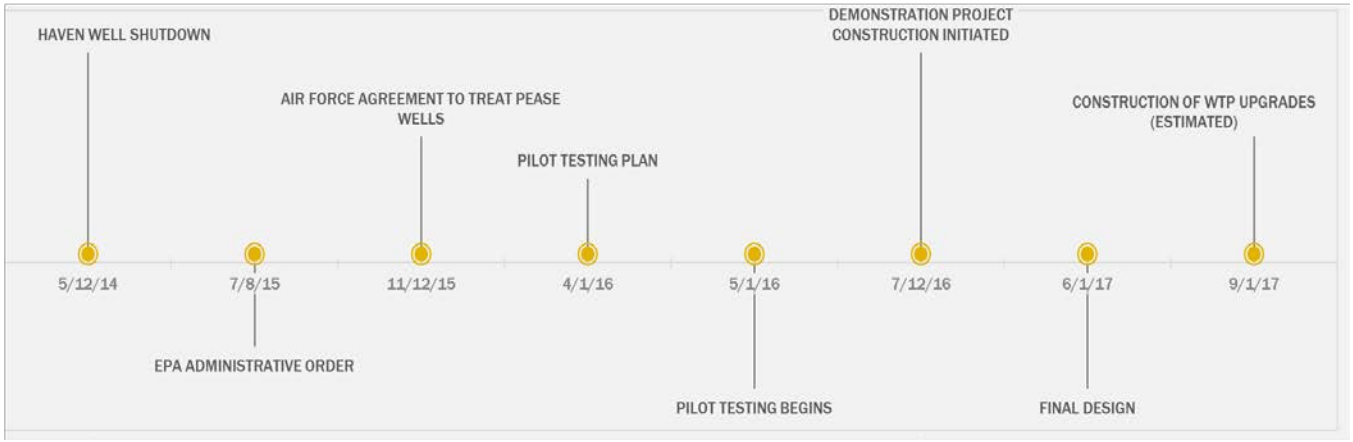
The treatment of the Harrison and Smith wells will demonstrate the effectiveness of the technology and performance of the system. An initial pilot study was completed in June 2016. Modifications to the Grafton Road Plant will allow for the installation of two 20,000 lb. granular activated carbon vessels (GAC) to filter and remove PFCs from the Harrison and Smith Wells. This work will be completed by early Autumn 2016.

Information from both the pilot and the demonstration study will then be used by the City's consultant to revise the final design parameters for treatment of the Haven Well. Pilot testing results indicated that the GAC filter media will remove PFCs without significant pressure build up or fouling in the media. General chemistry results indicate acceptable levels for pH and alkalinity with no anticipated disruption to the existing distribution system. Frequent sampling, filter monitoring, and operational requirements from the demonstration project will be evaluated for six months. Data from these efforts will be used to optimize the final design of a full-scale treatment system providing treated water to the Tradeport for the removal of PFCs. Final data and design plans for the Haven treatment system are planned for Spring 2017 with construction anticipated in the Fall of 2017. Haven well design will also include contingency planning and treatment retrofits to treat other contaminants if necessary.

This agreement with the Air Force will reimburse to the City for up to $58,700 for the system piloting and $831,000 for the filter installation and demonstration project. Additional agreements between the City and the Air Force for design and construction of the Haven Well treatment system will follow once the design parameters have been finalized.

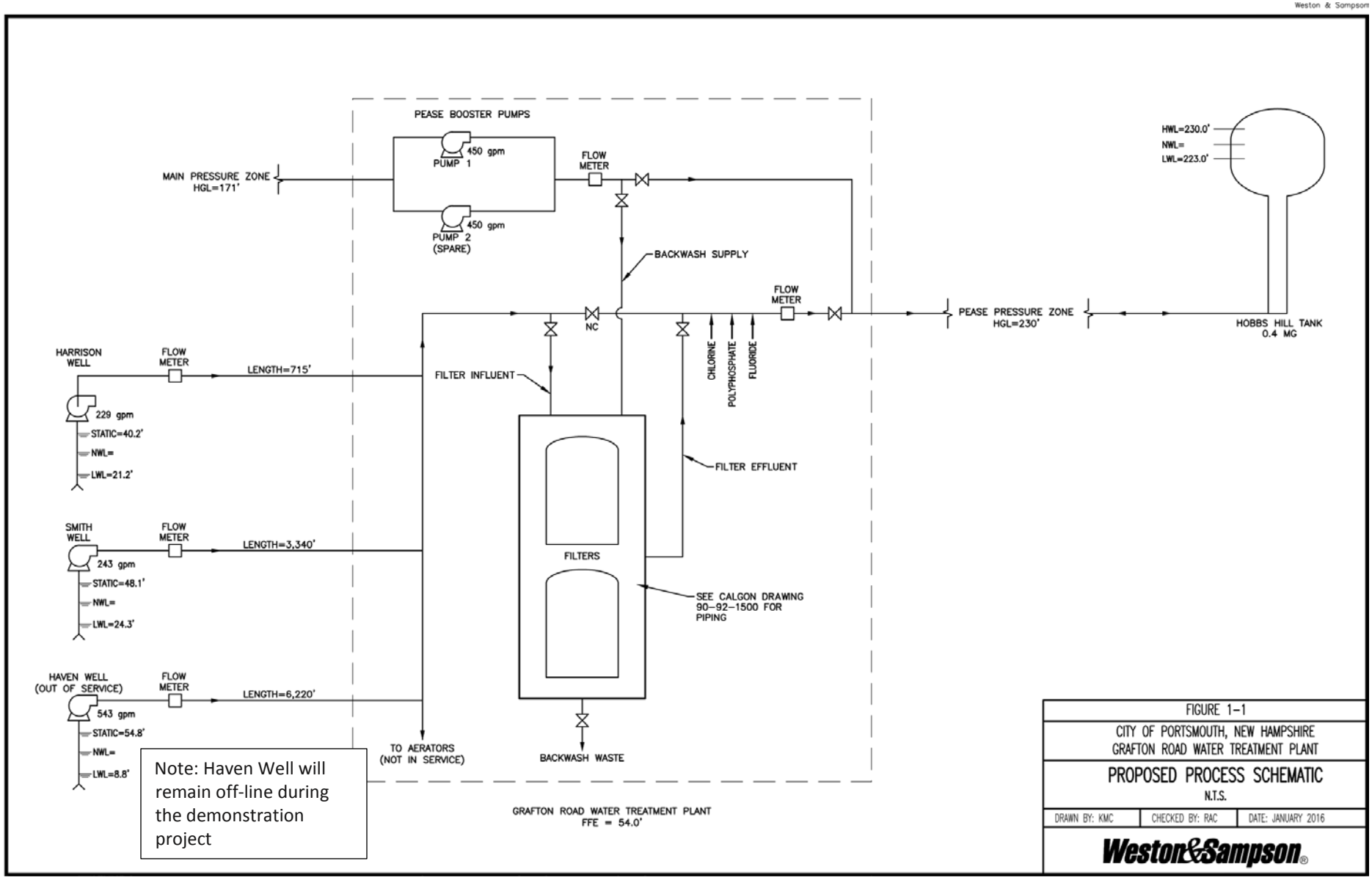
While implementing a frequent monitoring program *(see http://www.cityofportsmouth.com/publicworks/phwn.html),* the City of Portsmouth negotiated an agreement with the Air Force to fund:

- **An initial Pilot Study to evaluate the use of Granular Activated Carbon (GAC) Filtration**
- **A full-scale Demonstration/Feasibility Project**
- **Final design of a treatment facility capable of handling up to 1.2 million gallons per day (MGD)**



PROJECT TIMELINE

The filtration system for the demonstration will consist of granular activated carbon (GAC) as a filter media. Calgon pressure vessels will be filled with Filtrasorb 400 TM, which has been used effectively to treat PFCs in drinking water systems in Minnesota and Maryland. Like the pilot study, filter vessels for the demonstration project will be placed in series. Groundwater will be pumped through a primary filter (lead), while a second filter (lag) will provide additional filtration capacity to ensure effective removal of PFCs if any pass through the lead filter. Water quality will be monitored before, between, and after the filters to evaluate media life. The use of a lead/lag arrangement allows the GAC to be replaced in the lead filter when adsorptive capacities are fully utilized and PFC removal effectiveness is diminished. The lag filter is then placed in the lead role, and fresh Carbon is emplaced in the spent vessel. This dual filtration design provides redundancy and safety for finished water from the plant.



PEASE TRADEPORT WATER SYSTEM COMPONENTS

Water Storage Tank

Grafton Road Water Facility Booster Pumps

Harrison Well

Smith Well

GAC Filters

Filter 1 (left)
Filter 2 (right)

Control Rack and Computer
"Big Bird" and "Oscar"

Valves to control flow out of tanks and through each filter

Sensors to communicate flow and pressure data to computer

Turbidity sensors

Pumps to drive the pilot

(2) Storage & Aeration Tanks

Gages to monitor pressure into and out of Filters 1 & 2

Control flow from wells into tanks

All non-detect (U), including:
PFOS, PFOA, PFHxS, and PFNA

	UNITS	F1-1	RDL	MDL
Miscellaneous Parameters				
6:2 Fluorotelomer sulfonate	ug/L	0.0065 U	0.020	0.0065
8:2 Fluorotelomer sulfonate	ug/L	0.0055 U	0.020	0.0055
N-ethylperfluorooctane sulfonamide	ug/L	0.0053 U	0.020	0.0053
N-ethylperfluorooctane sulfonamidoe	ug/L	0.0049 U	0.020	0.0049
N-methylperfluorooctane sulfonamide	ug/L	0.0040 U	0.020	0.0040
N-methylperfluorooctanesulfonamidol	ug/L	0.0061 U	0.020	0.0061
Perfluorobutane Sulfonate (PFBS)	ug/L	0.0019 U	0.020	0.0019
Perfluorobutanoic acid	ug/L	0.0066 U	0.020	0.0066
Perfluorodecane Sulfonate	ug/L	0.0043 U	0.020	0.0043
Perfluorodecanoic Acid (PFDA)	ug/L	0.0066 U	0.020	0.0066
Perfluorododecanoic Acid (PFDoA)	ug/L	0.0057 U	0.020	0.0057
Perfluoroheptane sulfonate	ug/L	0.0036 U	0.020	0.0036
Perfluoroheptanoic Acid (PFHpA)	ug/L	0.0047 U	0.020	0.0047
Perfluorohexane Sulfonate (PFHxS)	ug/L	0.0040 U	0.020	0.0040
Perfluorohexanoic Acid (PFHxA)	ug/L	0.0046 U	0.020	0.0046
Perfluoro-n-Octanoic Acid (PFOA)	ug/L	0.0053 U	0.020	0.0053
Perfluorononanoic Acid (PFNA)	ug/L	0.0046 U	0.020	0.0046
Perfluorooctane Sulfonamide (PFOSA)	ug/L	0.0058 U	0.020	0.0058
Perfluorooctane Sulfonate (PFOS)	ug/L	0.0033 U	0.020	0.0033
Perfluoropentanoic Acid (PFPeA)	ug/L	0.0036 U	0.020	0.0036
Perfluorotetradecanoic Acid	ug/L	0.0052 U	0.020	0.0052
Perfluorotridecanoic Acid	ug/L	0.0032 U	0.020	0.0032
Perfluoroundecanoic Acid (PFUnA)	ug/L	0.0037 U	0.020	0.0037
Surrogate Recovery (%)				
13C4-Perfluorooctanesulfonate	%	97	N/A	N/A
13C4-Perfluorooctanoic acid	%	94	N/A	N/A
13C8-Perfluorooctanesulfonamide	%	88	N/A	N/A

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable