JACKSON HOLE AIRPORT
PFAS INVESTIGATION PLAN
June 2, 2020

BACKGROUND

Per- and poly-fluoroalkyl substances (PFAS) comprise a family of more than 5,000 man-made chemicals used in a wide range of common household, commercial and industrial products. They are found in products such as non-stick pans, water repellant fabrics and applications, pizza boxes and even some brands of dental floss. Among those products is Aqueous Film Forming Foam (AFFF), a fire extinguishing agent used to fight petroleum-based fires.

AFFF was developed in the 1970s and used at airports for aircraft fire emergencies. AFFF is an extinguishing agent for flammable liquid fires such as those caused by jet fuel due to its ability to form a layer of aqueous film over fuel to extinguish and prevent fire. The effectiveness of this film forming layer is dependent upon PFAS, which has stable chemical and thermal properties that do not easily break down when exposed to water or heat. Due to its effectiveness, the United States military created specification MIL-F-24385F which requires AFFF contain PFAS. In turn, the FAA has ordered certificated airports supporting air carrier operations, such as the Jackson Hole Airport (Airport), to use AFFF containing PFAS for aircraft fire emergencies.

Until recently, AFFF containing PFAS was not known to be an environmental concern. However, recent health studies have found that prolonged exposure to certain PFAS chemicals, including those contained in MIL-F-24385F AFFF, could result in risks to human health. Therefore, though AFFF containing PFAS must be used by airports in the event of an aircraft fire emergency, there is a concern that, notwithstanding the positive role they play in saving lives, should the compounds enter the environment at high levels, they could infiltrate groundwater, and potentially affect the health of those that have prolonged exposure.

While PFAS has not been clarified as a hazardous substance or a carcinogen by either the U.S. Environmental Protection Agency (EPA) or the Wyoming Department of Environmental Quality (WDEQ), the Airport, which is committed to continuing its role as an environmental steward and trusted neighbor, is proactively investigating this issue.

This PFAS Investigation Plan is focused on providing decision makers as well as local authorities, regulating agencies, and the surrounding community with a documented approach for the investigation and mitigation of any potential PFAS which is found in areas surrounding the Airport. Because PFAS is used commonly in many products and manufacturing processes, it may be difficult to attribute PFAS found in the environment with any source or activity, including the Airport. Nevertheless, understanding that the use of AFFF containing PFAS has occurred at the Airport, this PFAS Investigation Plan is being developed, in conjunction with steps that the Airport has already taken, to limit the use of AFFF containing PFAS. The sections below provide an overview on past use, actions taken to date, and steps forward to effectively address this emerging environmental issue.

STEPS ALREADY TAKEN TO LIMIT FUTURE USE

The Airport has already implemented a number of measures to limit the use of AFFF containing PFAS at the Airport going forward. Under these measures, PFAS should only be discharged on the Airport in the future in circumstances where its use is necessary to protect human life. These limiting measures include:

(a) Eliminating the need to discharge foam for required training exercises,

(b) The purchase and use of a "No Foam" system which eliminates any discharge of AFFF for Aircraft Rescue and Firefighting (ARFF) vehicle equipment calibration.

(c) Transitioning from a C8 to a C6 foam, [1] and

(d) Making changes to post-emergency response plans, so to the extent necessary and possible there will be timely containment, collection, and proper disposal of AFFF containing PFAS in the event of an aircraft fire emergency.

The Airport is staying abreast of possible changes to FAA requirements with respect to the use of AFFF containing PFAS. We are preparing to shift away from such use as soon as possible, if and to the extent FAA authorizes the use of another AFFF product.

STEPS ALREADY TAKEN TO INVESTIGATE LEGACY PFAS USE

PFAS has been used at the Airport as required by FAA. This has included discharges necessary to respond to aircraft and vehicle fires, and the periodic testing and calibration of firefighting equipment. No firefighting training site exists on the Airport, and thus there have been no training-related discharges.

With respect to the identification of potential legacy PFAS use, the Airport first worked with the nationally recognized firm of Mead & Hunt to complete the *Managing AFFF and PFAS at Airports (MAPA) Screening Tool*, as recommended in the Airport Cooperative Research Program Report 173,[2]
Use and Potential Impacts of AFFF Containing PFAS at Airports. That screening determined that though the presence of some on-Airport PFAS was likely, the extent of that risk was relatively low.[3]

Because it has not been classified as either a hazardous substance or a carcinogen, there are no legal requirements to test groundwater for the presence of PFAS. Nonetheless, because the Airport is and has

[1] U.S. EPA's 2010/2015 PFOA Stewardship Program focused on reducing longer chain (i.e., C8 or greater) perfluorinated chemicals and PFOA emissions, because data show that shorter chain compounds have a lower potential for toxicity and bioaccumulation. This change was made at the Jackson Hole Airport in 2009.

[2] The Airport Cooperative Research Program (ACRP) operates under the National Academy of Sciences, Engineering, and Medicine, and is managed by the Transportation Research Board. ACRP is an industry-driven, applied research program that develops near-term, practical solutions to airport challenges.

[3] Factors that attributed to a lower risk score from the MAPA Screening Tool included: previous AFFF was discharged on concrete that absorbed some of the material, lessening impact into the soil & groundwater and a low volume of AFFF was discharged.

been legally required to use AFFF containing PFAS, and because the screening indicated some risk of PFAS in groundwater, the Airport proactively decided to test all water wells located on Airport property.

Groundwater Sampling

In February 2020, sampling was conducted at 14 wells on Airport property to assess the potential for PFAS to exist in groundwater under the Airport. This testing, the results for which were received in March 2020, identified the presence of PFAS in certain groundwater wells on Airport property. Of the 14 wells tested, PFAS was detected in five wells (see **Figure 1 -** Jackson Hole Airport March 2020 Test Results). Of these, two wells contained concentrations higher than the U.S. Environmental Protection Agency's (EPA's) lifetime health advisory level of 70 parts per trillion (ppt). Reported concentrations of perfluorooctane sulfonate (PFOS)[4] in these two wells were 117 ppt and 382 ppt. All five wells in which PFAS was detected are monitoring wells, and none produce water.

Based on the results of the initial sampling, two additional wells were tested in late March. One is on-Airport and used in connection with drinking water for the control tower. No PFAS was detected in this well. The other is a domestic water well located near the Airport and directly downgradient from the on-Airport well which yielded the highest PFAS readings in the first round of testing. PFAS was detected in the off-Airport well at approximately 60 ppt, which is below the EPA Lifetime Health Advisory level.

Agency Coordination

Consistent with the 1983 Agreement between the Department of Interior and the Airport, the NPS was immediately informed of the Airport's well sampling results in March 2020. The Federal Aviation Administration and Wyoming Division of Aeronautics were also informed.

The Airport developed a Report on its PFAS use reduction efforts to date and its initial well testing results. In May 2020 it submitted the Report to and initiated coordination with the Wyoming Department of Environmental Quality (WDEQ). The Airport hoped to incorporate the Airport's PFAS efforts into the WDEQ's ongoing PFAS testing program. Aligning the Airport's efforts with the ongoing WDEQ program would allow for the standardization of testing methodologies and provide official guidance from WDEQ, the agency responsible for monitoring and maintaining environmental quality in Wyoming.

Though WDEQ initially offered the use of its team for well testing and assistance in developing the procedure for additional testing of private residential wells, it now recommends that the Airport utilize its own environmental consultants for future well testing, and use best practices for methodology.

ADDITIONAL STEPS TO ADDRESS PFAS

This PFAS Investigation Plan details the additional steps that the Airport will take to gather information, conduct outreach, and implement well testing off Airport property. This will provide information that will determine if any mitigation or remediation measures are necessary.

[4] Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are the only two PFAS compounds in which the US EPA has issued a drinking water health advisory.

The Airport is continuing to work with a nationally recognized environmental consulting firm, Mead & Hunt, Inc. Mead & Hunt has considerable experience in dealing with PFAS issues at other locations nationwide. The Airport also plans to continue its coordination with appropriate local, state and federal agencies, to ensure that its actions are consistent with best practices.

1) Develop Plan for Voluntary Residential Testing

The Airport has developed a plan to sample private residential wells immediately adjacent to the Airport on a voluntary basis. Though WDEQ recommended the testing of a minimum of 14 wells with the Voluntary Residential Boundary (the "Boundary") the Airport plans to offer testing to as many of the 45 residents within the Boundary which volunteer to have their wells tested. This program is designed to be sufficient to accurately determine the scope of any PFAS migration off Airport. However, depending on the results of such testing, additional residential or irrigation well testing may be required. The sections below define the proposed parameter to be used for the Voluntary Residential Testing.

Voluntary Residential Testing Boundary

Testing of residential wells within the Boundary will allow for an evaluation of the extent to which PFAS, that was detected in two wells on Airport property above the USEPA health advisory level, may have reached residential wells nearest to the Airport. Approximately 54 parcels are located within the Boundary. Of these, 45 parcels contain residences. Thirty-one of these residences are assumed to be occupied on a full-time basis. Full-time (versus seasonal) use of a residence is an assumption based on tax records that shows a contact address located in either the Towns of Jackson or Moose.

The Boundary was identified by overlaying USGS groundwater flow data (USGS, *Hydrogeology and Water Quality in the Snake River Alluvial Aquifer at Jackson Hole Airport, Jackson, Wyoming, Water Years 2011 and 2012*) with Airport well data (provided by Jackson Hole Airport) to determine the most likely potential pathway for PFAS migration. Those parcels located within a 0.25-mile radius of a vector of groundwater flow initiated at Well JH-3-20-1 comprise the Boundary (see **Figure 2** - Voluntary Residential Testing Boundary). Well JH-3-20-1 was chosen as the initiation site for the vector because it tested highest in PFOS (a PFAS compound) at the Airport (382 ng/L).[5]

The purpose of the testing is to define the magnitude and potential extent of PFAS in the groundwater. The Airport will solicit property owners located within the Boundary to volunteer for water sampling and analyses of their wells. The number of wells actually tested will be determined by the number of residents that volunteer.

Testing Methods

EPA Method 537.1 for drinking water will be the testing method used for sampling. This method analyzes for 14 PFAS compounds. Most of the public, health departments, and regulators associate Method 537.1 with drinking water.

Sample Locations

Residential testing will be conducted only on the source well, not on water sources inside the home. Residents will be asked to complete a questionnaire regarding their well and any associated treatment systems. If the residents have a treatment system on their wells, the type of treatment

[5] 1 nanogram/liter (ng/L) = 1 part per trillion (ppt)

(filtration/sedimentation, under the sink filter, etc.) will be identified and documented. This data will be collected for informational purposes only. Testing will be conducted pre-treatment system.

Thresholds of monitoring

In December 2019, the Environmental Protection Agency (EPA) established a lifetime health advisory of 70 ppt for PFOA and PFOS (two compounds in PFAS) in drinking water based on the agency's assessment of the latest peer-reviewed science. Although the health advisory is non-enforceable and non-regulatory, it is meant to provide technical information to states agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water. For the residential testing, a threshold of 70 ppt will be used to help determine next steps for mitigation.

2) Further Agency Coordination

It is important to incorporate relevant agencies early in the process to inform them of recent testing results at the Airport, identify any other potential source of PFAS in groundwater, obtain their guidance and feedback on the Airport's efforts, and integrate these agencies into any next steps to address the issue. Coordinating agencies for this PFAS Investigation Plan include the Town of Jackson, Teton County, Grand Teton National Park, WDEQ, FAA and the Wyoming Division of Aeronautics.

Coordination with these agencies will allow for a unified approach in communicating with and educating the public. While public outreach will be primarily conducted by the Airport and its consultants, these agencies can be of assistance in (1) distributing factual information to residents, (2) streamlining data collection regarding wells and other needs, (3) coordinating joint visits with residents, and (4) facilitating combined public meetings.

3) Public Outreach (*concurrent with Implementation of Voluntary Residential Testing*)

To facilitate comprehensive public outreach, a variety of tools will be used to communicate with residents located within the Boundary, as well as with the community at large. Following discussions with the WYDEQ and the Teton County Health Department, the following steps will be conducted for public outreach.

- Notifications
    - Educational materials mailed to residences located within the Boundary
        - Include questionnaire regarding wells (*see description below*)
        - Include permission form for access (*see description below*)
    - WYDEQ website updates (general PFAS information), as determined appropriate
    - Airport website updates (FAQs, updates, meeting notifications, meeting materials)
    - The HOA within the Boundary will be contacted and asked to email notifications to homeowners.

- Press Release (Frequently Asked Questions (FAQs), summary of test results of Airport wells, high level next steps,)

Questionnaire: A questionnaire will be developed to gain information regarding residential wells and any treatment systems in place. Questionnaires will be distributed at the public meeting to those homeowners located within the Boundary. The questionnaire will also be mailed to each of these residents.

Permission form for access: Entry and Testing Agreement form will be developed to secure access to property and right to test wells.

Commenting Email Address: A unique email address will be established, specific for this project, for residents to submit comments.

4) Implementation of Well Testing.

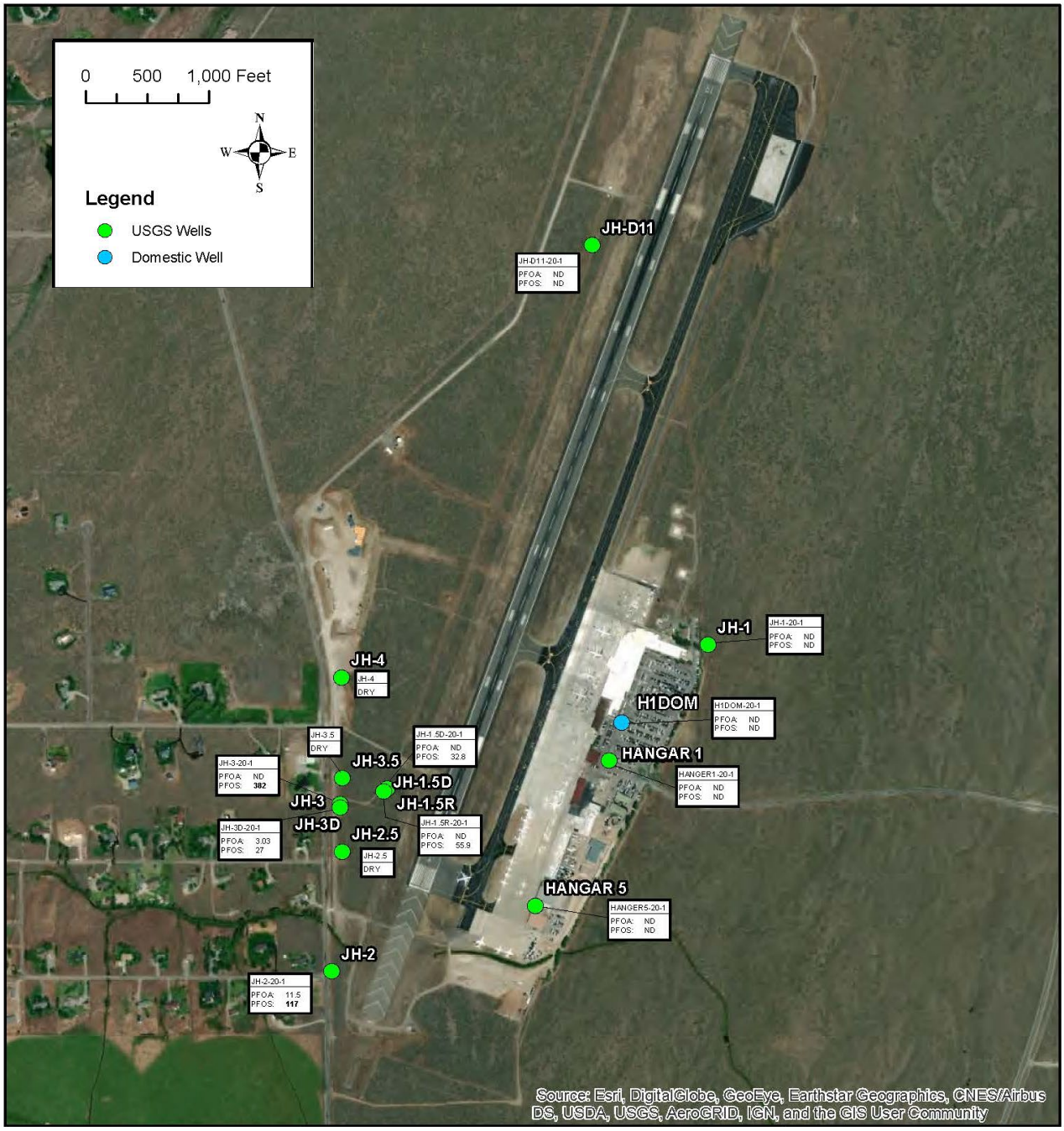
After the comments of other agencies have been received and considered, this Investigation Plan will be modified if and as necessary. The team will then implement testing of domestic water wells, as soon as a pool of volunteers for testing has been identified through public outreach.

A second round of groundwater samples for Airport wells will probably be conducted in July 2020 when it is considered "wet weather" conditions. These data will be used to determine if there is seasonal variability in detected PFAS concentrations. Following review of the wet weather data set, any wells with non-detect results in both sampling events will be safely removed from the test protocols.

5) **Possible Mitigation and/or Remediation**.

At this time, there is no evidence that PFAS exists in areas surrounding the Airport at levels which exceed EPA's lifetime advisory limit. Additional testing of off-airport domestic water wells will determine if PFAS is present at levels that exceed the advisory limit. If testing finds that this limit has been exceeded in any domestic water well, a number of effective remediation measures are available. Drinking water or countertop water filter systems may be provided to the users of these wells, while decisions are made regarding other remediation measures. These other measures could include at-the-well filter systems which have proven effective to remove PFAS. Systems also exist to remove, filter and reinject groundwater while it is still on the Airport, and thus prevent the continued spread of PFAS in groundwater to areas off the Airport. If further testing indicates that remediation is necessary, the measure or measures to be employed will be chosen in consultation with WDEQ and Teton County Health.

Figure 1 - Jackson Hole Airport March 2020 Test Results



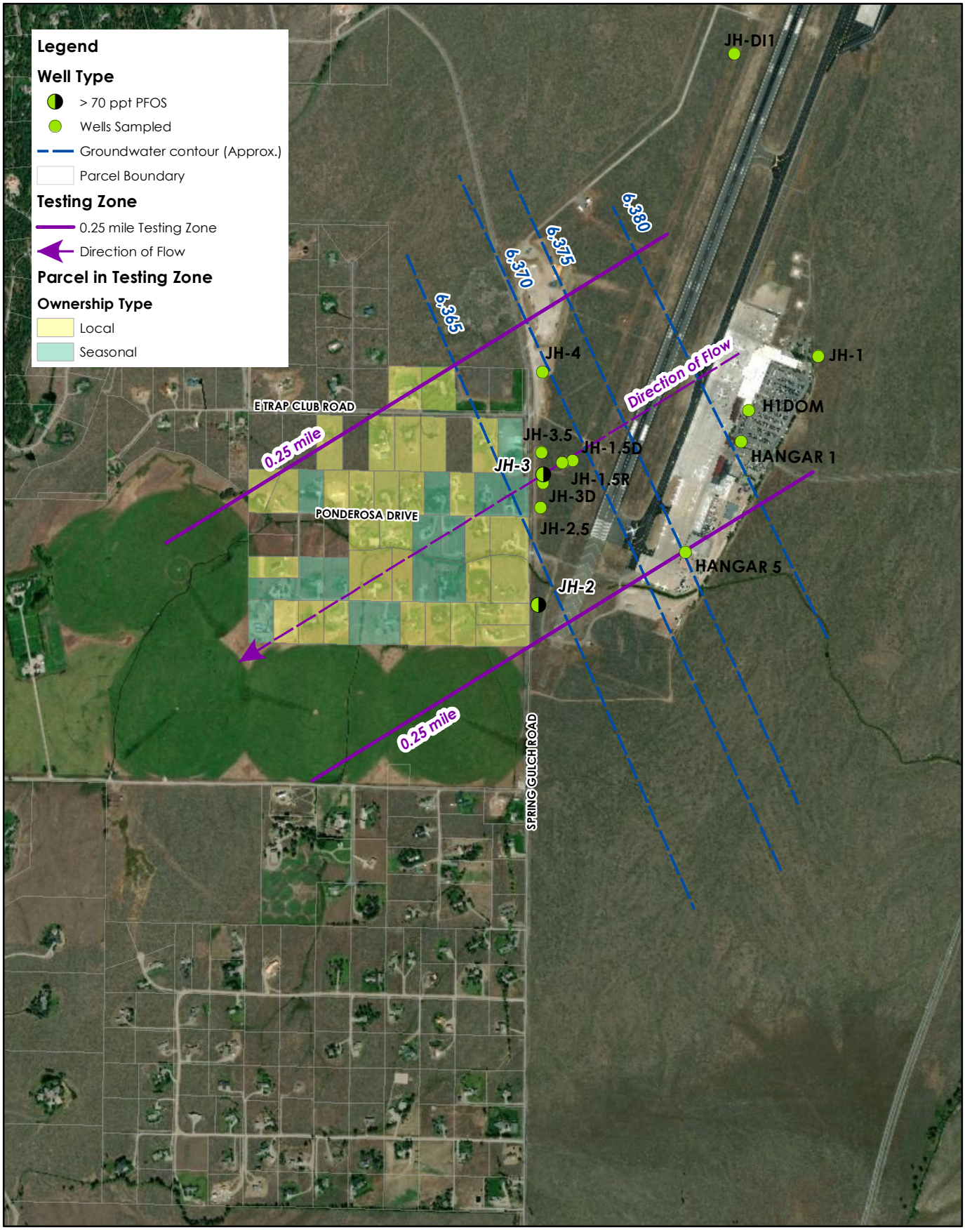


Image source: ESRI, Inc World Imagery

Voluntary Residential Well Testing Boundary
Jackson Hole Airport

0 305 610 1,220 1,830 2,440 Feet