



## **JACKSON HOLE AIRPORT**

### **PFAS MANAGEMENT PLAN**

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#### **JACKSON HOLE AIRPORT**

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**What's New in This Revision?**

*The PFAS Management Plan was restructured to better organize Jackson Hole Airport's investigative efforts chronologically. Updates since the July 13, 2023 version of this Plan include the transition from Aqueous Film Forming Foam (AFFF) to fluorine-free firefighting foam (F3), results from the August 2023 residential sampling event, results from the November 2023 on-airport sampling event, and updates to relevant attachments to include new data.*

**EXECUTIVE SUMMARY**

Per- or poly-fluoroalkyl substances (PFAS) are a family of more than 10,000 man-made chemicals used in a wide range of common products. They are found in non-stick pans, water repellant fabrics, fast food packaging, and even some brands of dental floss. Among those products is Aqueous Film Forming Foam (AFFF), which is effective in fighting petroleum-based fires. As a result, the Federal Aviation Administration (FAA) had previously required all airports serving airlines to use AFFF containing PFAS in aircraft fire emergencies. PFAS has been determined to have potential health impacts. Studies found that prolonged exposure to certain PFAS chemicals could result in risks to human health.

In September 2023, the United States Department of Defense Qualified Products Database (QPD) certified the first fluorine-free firefighting foam (F3) agent. Shortly after, the FAA authorized Part 139 airports to be able to use certified F3 products listed on the QPD to meet fire extinguishing agent requirements. In October 2023, Jackson Hole Airport (Airport) discontinued use of AFFF and transitioned to use of only F3 in emergency cases. Additionally, the Airport purchased two new firefighting vehicles which are anticipated to be delivered in 2024. Once delivered, these vehicles will be filled only with F3.

Wyoming Department of Environmental Quality (WDEQ) serves as the state's regulatory agency for protection and conservation of the state's land, air, and water. The WDEQ does not develop its own drinking water standards, but incorporates the U.S. Environmental Protection Agency (EPA) standards into its state regulations. While WDEQ does not have specific requirements that Wyoming airports test for PFAS in groundwater, there are WDEQ requirements for "contaminants" introduced into the environment. Because the FAA previously required the use of AFFF containing PFAS on airports, in 2019 the Jackson Hole Airport proactively initiated an investigation of PFAS found on and near its airfield, including residential areas off-airport, and has implemented continued monitoring and mitigation efforts since that time. The WDEQ has served as a consulting partner throughout the investigation, and has been informed of sampling efforts and mitigation measures implemented to date, which are discussed in this report.

The Jackson Hole Airport (Airport) is committed to staying abreast of regulatory changes related to PFAS. To date, the U.S. Environmental Protection Agency (EPA) has established and revised a

lifetime health advisory (LHA) for PFOA and PFOS (two PFAS compounds), has issued Regional Screening Levels (RSLs) for eight PFAS compounds, and has proposed enforceable Maximum Concentration Limits (MCLs) for PFOA and PFOS. Refer to Section 2 for a detailed regulatory overview.

#### Jackson Hole Airport Investigation Summary

In 2020 the Jackson Hole Airport tested its monitoring wells located on the airfield. Of the 13 wells tested, PFAS was detected in five. Of these, two contained concentrations higher than EPA's then current LHA level of 70 ppt.

The Airport then moved to test private residential wells located adjacent to and downgradient from the airfield (Phase 1 Area). Initially, 32 homeowners volunteered their wells for testing. Of these, 31 wells tested as either "no detect" or were below EPA's then current LHA of 70 ppt; only one well tested slightly above it. Soon after, 14 more Phase I homes volunteered for the program, and additional testing occurred. PFAS was detected in all but two of these wells, but no results were above the 2016 EPA LHA of 70 ppt. Though not required by any regulation or standard, the Airport proceeded to offer point-of-entry treatment (POET) filtration systems for all homes located in this Phase I Area, upon request and regardless of whether PFAS was detected in the well. The filters offered by the Airport are certified to remove both PFOA and PFOS.

To determine the extent of PFAS migration in groundwater, the Airport then sequentially tested wells in the Phase 2 and Phase 3 Areas, located farther from the airfield. These tests were of 94 residential wells, 3 utility wells, 1 irrigation well, and one surface water test. Of these, no wells tested above the 2016 EPA LHA.

Though these wells tested safely below the 2016 LHA, to ensure protection of the community, the Airport then offered POET filtration systems for all domestic water wells adjacent to the airfield which were estimated to test at or above 10 ppt for either PFOA or PFOS, or a combination of them. The threshold of 10 ppt mirrored the most stringent regulatory standard then adopted by any jurisdiction in the United States. After the June 2022 EPA decision to revise the 70 ppt LHA for PFOS and PFOA in drinking water to 0.004 ppt for PFOA and 0.02 ppt for PFOS, the Airport determined to provide filters for any well located within an area in which it was estimated that any concentration of PFOS or PFOA would be detected in groundwater, or in which PFOS and PFOA were actually detected.

To date, 55 filters have been installed on 53 residential properties located in the Phase 1 Area, and 49 filters have been installed on 28 residential properties located in the Phase 2 and Phase 3 Areas. In total, 104 filters have been installed on 81 properties. Additional filters may be installed in the future at homeowner request.

After completing three phases of residential sampling, the Airport committed to continued monitoring of wells both on the airfield and in residential areas off the airfield for at least two years (through 2024), both in wet and dry seasons, to account for seasonal variability in groundwater conditions. All results from continued monitoring events are included in this report.

This PFAS Management Plan (“Plan”) was developed to communicate the Airport’s approach for the investigation and mitigation of PFAS found on and near its airfield. It is continually updated as additional information becomes available and will continue to be updated in the future. The Airport communicates on a regular basis with WDEQ, the National Park Service, FAA, the Teton Conservation District, and the Teton County Public Health Department. Public outreach is being conducted through direct communication with surrounding residents and via website postings.

Our number one priority at the Airport is the safety of our operations – both for passengers and the surrounding community. As this Plan shows, we also make environmental stewardship a vital part of everything we do.

## **Introduction**

This PFAS Management Plan is continually updated to provide information to the public and affected governmental agencies regarding the PFAS investigation at the Jackson Hole Airport (the “Airport”). It will explain why PFAS is present in soils and groundwater at the Airport. It will also set forth actions the Airport has taken, is taking, and will take in the future to minimize the use of PFAS on the airfield, protect drinking water supplies in adjacent areas, and investigate and start removing or isolating PFAS in soils and groundwater on the airfield.

Because PFAS is used commonly in many products and manufacturing processes, it may be difficult to attribute all PFAS found in the environment with any specific source or activity, including the airfield. Nevertheless, understanding that the use of Aqueous Film Forming Foam (AFFF) containing PFAS has occurred on the airfield, this Plan has been developed, in conjunction with actions that Airport has already taken, to eliminate the use of AFFF containing PFAS, investigate past use of AFFF containing PFAS, take actions to mitigate PFAS concentrations in drinking water wells downgradient from the airfield, and conduct appropriate remediation of PFAS which has migrated to soils and groundwater. The following sections provide an overview on past use, actions taken to date, and steps forward to effectively limit and manage this emerging environmental issue.

The science surrounding PFAS, how it can best be remediated, and its possible adverse health effects continues to evolve. This Plan is therefore intended to be a living document which will be updated from time-to-time as more is known, and as the Jackson Hole Airport Board (the “Airport Board”) undertakes further actions to investigate and manage PFAS, mitigate its possible adverse effects, and remediate its existence on and adjacent to the airfield. This Plan was originally prepared as an interim document in April 2020. This form of the Plan was first issued in December 2020 and has since been periodically revised. Further information concerning this Plan may be obtained by contacting Megan Jenkins, at [megan.jenkins@jhairport.org](mailto:megan.jenkins@jhairport.org) or at 307-733-7685.

## **1. Background**

Per- or poly-fluoroalkyl substances (PFAS) comprise a family of more than 10,000 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 repellent fabrics and applications, fast food packaging, and even some brands of dental floss. Among those products containing PFAS is 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 ideal 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 required that AFFF contain PFAS. In turn, the Federal Aviation Administration (FAA) ordered certificated airports supporting air carrier operations, such as the Jackson Hole Airport, to use MIL-F-24385F-certified AFFF

containing PFAS for aircraft fire emergencies. FAA also required that airports periodically test firefighting equipment to ensure its operational capability in the event of an emergency. This required AFFF to be discharged as part of the firefighting equipment testing exercise.

In recent years, PFAS has been determined to have potential health impacts. 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, although AFFF containing PFAS has had a positive role in saving lives and FAA required it be used by U.S. airports in the event of an aircraft fire emergency, there is a concern that releases to the environment infiltrated groundwater and potentially affected the health of those that have prolonged exposure.

As concerns regarding PFAS grew, Congress mandated as part of the 2018 FAA Reauthorization Act that the FAA cease requiring airports to use AFFF containing PFAS by October 4, 2021. This required the FAA to test different PFAS-free firefighting foam products to find an effective alternative. In January 2023, the United States Department of Defense (DoD) released a military specification (MIL-SPEC) MIL-PRF-32725 that provided a performance specification for fluorine-free foam (F3) fire extinguishing agents which was used by the FAA as part of their testing. In September 2023, the United States Department of Defense Qualified Products Database (QPD) certified the first F3 firefighting extinguishing agent liquid concentrate to meet the performance requirements of the new military specification (MIL-PRF-32725). The first product certified for use was Solberg's 3 percent MIL-SPEC Synthetic Fluorine-Free Foam (SFFF). Shortly after the QPD was published, the FAA published CertAlert 23-07, which authorized Part 139 airports to be able to use certified F3 products listed on the QPD to meet fire extinguishing agent requirements.

## **2. Regulatory Overview**

EPA has regulatory authority to promulgate drinking water standards, or Maximum Contaminant Levels (MCLs). Several states maintain staff to review and institute state-specific MCLs for emerging contaminants; but their MCLs must be equal to or less than the national levels. Other states, such as WDEQ, incorporate the national MCLs, as they are federally promulgated, into state regulations and then proceed with enforcement of the regulations. Since 2016, EPA has been researching a small subset of PFAS to determine appropriate levels in drinking water for the protection of human health. Two items of particular interest to the Airport are: proposed hazardous substance designation for PFOA and PFOS<sup>1</sup> and development of MCLs.

As of February 2024, PFAS has not yet been classified as a hazardous substance by either the EPA or the WDEQ. EPA published a draft rulemaking in September 2022 on the subject, but what that rule will specify is not yet known.<sup>2</sup> EPA anticipates completion of this rulemaking in 2024.

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<sup>1</sup> Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are two PFAS compounds found in AFFF for which the EPA has issued a drinking water lifetime health advisory.

<sup>2</sup> While PFAS has not yet been classified as a hazardous substance, on September 6, 2022, the EPA released a proposed rule which seeks for the first time to exercise its authority under Section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") to designate PFOA and PFOS under the



A timeline for EPA issuance of drinking water levels follows and the following table correlates the sampling events with the EPA guidelines:

- 2016, EPA established a drinking water lifetime health advisory (LHA) [*“2016 LHA” hereinafter*] of 70 parts per trillion (ppt) for total PFOA and PFOS (two compounds in PFAS) in drinking water based on the EPA’s assessment of the latest peer-reviewed science.<sup>3</sup>
- June 2022, Then on June 15, 2022, EPA released a revised and unexpectedly low LHA which reduced recommended levels from a combined 70 ppt, to 0.004 ppt for PFOA and 0.02 ppt for PFOS [*“2022 LHA” hereinafter*]. This is several thousand times lower than 70 ppt, and below the level which can even be detected or measured by current technology. The health advisory is non-enforceable and non-regulatory and is meant to provide technical information to state agencies and other public health officials on health effects, analytical methodologies, and treatment technologies associated with drinking water.
- November 2022, EPA issued Regional Screening Levels (RSLs, EPA 2022a) for six PFAS compounds of which PFOS is 40 ppt and PFOA is 60 ppt. In May 2023 the EPA issued RSLs for an additional two PFAS compounds. For screening purposes, the EPA RSLs are used for water results from groundwater monitoring wells. RSLs are not cleanup standards and are calculated using conservative exposure assumptions and established LHA or cleanup levels for PFAS in groundwater or surface water and have indicated they are deferring to EPA LHA levels (WDEQ 2021).
- March 2023, the EPA **proposed** to adopt enforceable Maximum Concentration Limits (MCLs) for PFOS and PFOA at 4 ppt each. EPA’s timeline for finalizing these MCLs into federally enforceable levels is early 2024. Once finalized, MCLs for PFOA and PFOS will be applicable to all drinking water sources (private and public well systems). When the MCLs are finalized, public water supply systems will be required to meet the limits within three years.

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CERCLA definition of “hazardous substances.” The EPA accepted public comments on the proposed rule until November 7, 2022, and intends to publish a final rule in 2024.

<sup>3</sup> The lifetime health advisory (LHA) is derived for an adult weighing 70 kg (154 pounds) and assumes daily exposure over a period of an average lifetime (approximately 70 years). For PFAS, one would have to drink two liters (8.5 cups) of water per day from the same unfiltered tap with PFAS concentrations above 70 ppt for a total of 70 years. A ppt, or part per trillion, is an extremely small measurement unit. In units of time, it would be 1 second in 32,000 years. Even the original lifetime health advisory of 70 parts per trillion equates to approximately 3.5 droplets of water in an Olympic size swimming pool (660,000 gallons).

### **Timeline for USEPA's Issuance of PFAS drinking water levels**

<b>Dates of Relevant Thresholds</b>	<b>Threshold levels, ppt</b>	<b>Applicable JAC Sampling events</b>
2016 LHA	70 70 - PFOA or 70 - PFOS or 70 - total PFOS and PFOA	February 2020 (ASM) April 2020 (RCM) June 2020 (RCM) August 2020 (RCM) February 2021 (RCM) May 2021 (ASM) August 2021 (RCM) November 2021 (ASM) February 2022 (RCM) May 2022 (RCM) August 2022 (ASM)
June 15, 2022	proposed LHA: 0.004 - PFOA 0.02 - PFOS	August 2022 (RCM)
November 2022	RSLs: 60 - PFOA 40-PFOS	June 2023 (ASM) November 2023(ASM)
March 2023	proposed MCLs: 4 - PFOA 4 - PFOS	February 2023 (RCM) * August 2023 (RCM)

LHA - Lifetime Health Advisory

RCM - residential continued monitoring

ASM - airfield semi-annual monitoring

RSL - Regional Screening Levels for groundwater

MCLs - maximum contaminant level for drinking water

\* samples collected in February, but data available in March

### **3. Actions Taken to Limit & Eliminate Future AFFF Use**

In October 2023, the FAA published CertAlert 23-07, which authorized Part 139 airports to be able to use certified F3 products to meet fire extinguishing agent requirements. Immediately after

FAA's October 2023 authorization to approve use of F3 agent, Jackson Hole Airport eliminated the use of AFFF containing PFAS by transitioning to use of only F3 in emergency cases.

Previous to the transition from AFFF to F3 agent, the Airport implemented measures to protectively manage any releases which were necessary. Under these measures, PFAS was only discharged on the airfield when necessary to protect human life. The following sections discuss measures implemented to limit, and ultimately eliminate, use of AFFF at the Airport.

### 3.1 Eliminating Discharges of Foam for Training.

FAA requires periodic training for firefighters at commercial service airports to prevent or extinguish fuel-based fires in the event of an emergency. Historically, this training has been conducted at an FAA-approved training site located outside Teton County, and only occasionally at the Airport itself. As the possible harmful effects of PFAS in AFFF have become known, training with AFFF on the Airport has ceased. No further training using AFFF will occur on the airfield.

### 3.2 Eliminating Discharges for Equipment Calibration.

The FAA also requires that commercial service airports annually calibrate equipment used to dispense AFFF to ensure proper flow in the event of a life-safety emergency. Prior to January 2019, such calibration required a discharge of AFFF from the airport's firefighting equipment. When FAA Cert-Alert 19-01 was published in January 2019 permitting the use of certified closed-loop, or "no foam" testing systems to calibrate firefighting equipment without discharging AFFF, the Airport purchased and continues to use a "no foam" system for all semi-annual testing of equipment.

### 3.3 Transitioning from a C8 to a C6 Foam.

In 2000, 3M voluntarily initiated a phase-out of all C8 PFOS and PFOA production, and associated AFFF products. This phaseout was completed in 2002. The EPA's 2010/2015 PFOA Stewardship Program focused on reducing C8 PFOA content in products and PFOA emissions, because data show that shorter chain C6 compounds have a lower potential for toxicity and bioaccumulation. The Airport took the step of transitioning from C8 to C6 foam in 2009. Only AFFF containing shorter chain perfluorinated chemicals since that time was used on the airfield, if necessary.

### 3.4 Limiting Future Use of AFFF Containing PFAS.

AFFF was only dispensed on the airfield to protect against or suppress Class B fuel fires associated with emergency, life-safety events such as aircraft accidents. AFFF containing PFAS was not utilized on the airfield for any other purpose, including brush fires, structural fires, or any incident that did not involve a Class B fuel.

### 3.5 Post-Emergency Response Plan.

Timely containment, collection, and proper disposal of firefighting foam is planned in the event an aircraft fire emergency requires the use of foam. This includes discharge of F3. The same procedures shall be utilized if there is any accidental discharge of firefighting foam on the airfield. If foam is dispensed by Airport staff on or off the airfield, all practical efforts will be made to contain the product and prevent any from entering the Underground Detention System or other drainage systems. The Environmental Manager will be notified of any foam discharge, and he/she will promptly (a) identify and document the maximum area affected by the discharge, and (b) oversee reasonable restoration procedures, based on current requirements and/or best practices, as needed. Environmental cleanup may be contracted to a professional environmental remediation service, and the third-party costs of such activity may be charged back to the responsible party.

### 3.6 Protection of Personnel.

Previous to the introduction of F3, all Airport personnel working with AFFF would wear proper personal protective equipment (PPE). PPE, at a minimum, included Nitrile gloves and eye protection. Respirators or SCBAs were required when refilling AFFF into the firefighting apparatus or dealing with large spills. If personnel came into contact with AFFF they would rinse their eyes and/or skin immediately upon contact. If AFFF was ingested, personnel would seek medical attention.

### 3.7 Transition to Fluorine-Free Foam (F3) Agent.

In November 2022, the Airport adopted a Fluorine-Free Foam (F3) Transition Plan (the “Transition Plan”) for aircraft rescue and firefighting (ARFF) operations at the Airport. The Airport recognized that the demand for F3 would be high when this certification occurred. This is because in addition to Part 139 airports, military facilities would also be procuring large amounts of the new formula F3. Initial supplies of F3 were anticipated to be limited until production increases. The Airport therefore believed it important to plan efficiently and cost-effectively to procure F3. The Transition Plan outlined steps that would be taken to procure and transition to the use of F3. These steps were organized by three focus areas: Pre-Procurement Planning, Procurement / ARFF Operational Transition, and ARFF Operational Practices. ARFF Operational Practices did not assume the safety of the non-PFAS F3, even if certified by the manufacturers and distributors. Rather, precautions will be taken to limit the discharge of new-formula F3 to ensure there are no unintended negative effects on the environment and water supplies.

In September 2023, the United States Department of Defense Qualified Products Database (QPD) certified the first F3 firefighting extinguishing agent liquid concentrate to meet the performance requirements of the new military specification (MIL-PRF-32725). The Airport implemented the Transition Plan and officially transitioned to F3 agent in October 2023. Additionally, the Airport purchased two new firefighting vehicles to prevent any legacy PFAS residue in the foam systems of existing vehicles from contaminating the newly acquired F3. Once delivered, these vehicles will be filled only with F3.

## **4. Actions Taken to Investigate Legacy AFFF Use**

AFFF with PFAS has historically been used on the airfield as was required by FAA. This included discharges necessary to respond to aircraft and vehicle fires, and the periodic testing and calibration of firefighting equipment. The Jackson Hole Airport has never had an Aircraft Rescue and Firefighting training facility on its premises, and therefore any AFFF discharges on the airfield in the past for training purposes were minimal.

With respect to the identification of potential legacy AFFF use, in 2019 the Airport first worked with the nationally recognized environmental consulting 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,<sup>4</sup> *Use and Potential Impacts of AFFF Containing PFAS at Airports*. That screening identified the areas of AFFF use and focused efforts for determining next steps in investigating the presence of PFAS.

A map of probable areas in which AFFF has been used on the airfield for training and calibration purposes (in blue circles) and for emergency response (in green circles) is illustrated in **Attachment 1 – Past Use of AFFF (with PFAS) at Jackson Hole Airport**.

## **5. Actions Taken to Investigate PFAS Presence in Groundwater**

Because it has not officially 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 was legally required to use AFFF containing PFAS, and because the screening indicated PFAS in groundwater, the Airport proactively decided to test water wells located on and off Airport property. The timelines for two separate groundwater testing programs are provided in the following sections: on-airport testing and residential (off-airport) testing.

### **5.1 On Airport Testing**

**February 2020:** Sampling was conducted at 13 wells on the airfield to assess the potential for PFAS to exist in groundwater. This testing event, the results for which were received in March 2020, identified the presence of PFAS in certain groundwater wells on the airfield. Of the 13 wells tested, PFAS was detected in five wells. Of these, two wells contained concentrations higher than EPA's 2016 LHA (70 ppt). Reported concentrations of PFOS and PFOA in these two wells were 128.5 ppt and 382 ppt. All five wells in which PFAS was detected are monitoring wells, and none are used for drinking water. (See **Attachment 2** - Jackson Hole Airport Well Cumulative PFAS Figure and **Attachment 3** - Jackson Hole Airport Well Cumulative PFAS Data Table).

Based on the results of this initial sampling, two additional wells were tested in late March 2020. One is on-airfield and used in connection with drinking water for the control tower. No PFAS was detected in this on-airport well. The other is a domestic water well located near the airfield and directly downgradient from the on-airfield well which yielded the highest PFAS readings in the

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<sup>4</sup> 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.

first round of testing. PFAS was detected in this off-airfield well at 60 ppt, which was below the 2016 LHA (70 ppt).

## 5.2 Continued Monitoring of On Airport Wells

On-airfield monitoring wells will be monitored twice a year (through 2024) to account for seasonal variability in groundwater conditions. Testing events will occur in low water season (winter/spring), while others will occur in high water season (summer/fall). The on-airfield wells in which PFAS was detected are not drinking water wells. Accordingly, the methodology was revised to reflect that these results are not compared to EPA's LHA for drinking water, but rather to the EPA RSLs.

**May 2021:** the Airport conducted a round of testing of on-airfield monitoring wells. This additional sampling event was conducted for two principal purposes. The first was to test for possible variability in PFAS concentrations as a result of seasonal differences in groundwater levels. The second was to conduct "slug tests" at wells to evaluate hydraulic connectivity. The results of these tests may be utilized in the engineering design phase. Test results showed that PFAS concentrations in some on-airfield wells decreased over February 2020 levels, concentrations in other wells increased somewhat, and some remained about the same. The differences in concentrations may be partially due to the time of year a sample was collected and/or the sampling methodology.

**November 2021:** the Airport conducted a round of testing from nine of the on-airfield monitoring wells and the Control Tower drinking water well. The groundwater monitoring results are generally similar to those from previous sampling events with the exception of lower PFAS concentrations in JH-2 and JH-3 compared to February 2020. The Control Tower drinking water well resulted in non-detect.

**Spring and Fall 2022:** The Airport did not conduct on-airfield testing of wells because access to the wells was hindered by the runway reconstruction project.

**May/June 2023:** the Airport conducted a round of testing from nine of the on-airfield monitoring wells and the Control Tower drinking water well. Levels have decreased such that only PFOS concentrations detected in one on-airfield monitoring wells (JH-1.5) are now above the current RSL (as defined above). PFOA detected concentrations in all 10 wells were not above its current RSL.

**November 2023:** the Airport conducted a round of testing from eight of the on-airfield monitoring wells and the Control Tower drinking water well. PFOS concentrations were slightly higher in some of the monitoring wells when compared with previous sampling events, which may be a result of the lower groundwater elevations. PFOS detected concentrations in three wells were above its current RSL; while PFOA detected concentrations in all 8 wells were not above its current RSL. Additional sampling events will assist with understanding temporal variations in the concentration of PFOA and PFOS and will allow for statistical evaluation of chemical data trends, which typically require 6 to 10 data points per location. **Attachment 2** - Jackson Hole Airport

Well Cumulative PFAS, provides a figure with the cumulative data from on-airfield well sampling events with the cumulative data reported in **Attachment 3** - Jackson Hole Airport Well Cumulative PFAS Data Table.

### 5.3 Voluntary Residential Well Testing (Initial Phases).

Phase 1 Testing: In June 2020, the Airport conducted testing on private residential wells located immediately adjacent to and downgradient of the airfield. This is referred to as the Phase 1 Area. Testing of residential wells within the Phase 1 Area was undertaken to evaluate the extent to which PFAS on the airfield may have reached residential wells nearest to the airfield.

The Phase 1 Area 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 data provided by the Airport to determine the potential groundwater flow direction for PFAS migration. Those parcels located within the neighborhood immediately west and southwest of the airfield wells comprise this Phase 1 Area (see **Attachment 4** – Phase 1 Voluntary Residential Testing Area). Well JH-3-20-1 was chosen as the initiation site for the vector because it tested highest in PFOS on the airfield (382 ng/L).<sup>5</sup>

Approximately fifty-four (54) parcels are located within the Phase 1 Area. Of these, forty-five (45) parcels contain residences. Thirty-one (31) of these residences are estimated to be occupied on a full-time basis.<sup>6</sup> The Airport solicited property owners located within the test area to volunteer for water sampling and analyses of their wells.

WDEQ recommended testing a minimum of thirteen (13) wells within the Phase 1 Area. The Airport offered testing to all 45 of the Area's residences. Thirty-two (32) residents initially volunteered their wells for testing, and all were tested. Thirty-one (31) of these private wells tested as either "no detect" or were below the 2016 LHA (70 ppt). Only one well tested above the 2016 LHA advisory at 70.3 ppt.

The Airport tested for the list of PFAS compounds specified in EPA's Method 537.1 analysis. The lab reports from this and other EPA methods include the full set of parameters specified in the method. Other PFAS compounds have been detected in some samples that the Airport has collected, but PFOA and PFOS are in the highest concentrations. This is consistent with the fact that these are the two primary PFAS compounds identified in AFFF formulations. Accordingly, these are the two PFAS compounds whose presence in groundwater is likely to be associated with airport operations. For this reason, PFOA and PFOS are the focus of the Airport's investigations.

Since the time of the original testing, the 13 remaining homes volunteered for the program, and additional testing occurred. PFAS was detected in all but two of these 13 wells (results ranged

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<sup>5</sup> 1 nanogram/liter (ng/L) = 1 part per trillion (ppt)

<sup>6</sup> Full-time (versus seasonal) use of a residence is an assumption based on tax records that show a contact address located in either the Towns of Jackson or Moose.

from 7 to 49.5 ppt), but no results were above the 2016 LHA of 70 ppt. (See **Attachment 5 – Phase 1 Testing Results**).

To avoid potential contamination from plumbing systems components, such as Teflon seals, residential testing was conducted only on the source well, not on water sources inside the home. Residents were asked to complete a questionnaire regarding their wells and any associated treatment systems. If the residents had a treatment system on their wells, the type of treatment (filtration/sedimentation, under the sink filter, etc.) were identified and documented. This data was collected for informational purposes only, as testing was conducted pre-treatment system.

Phase 2 Testing: Based on results from the Phase I voluntary residential testing effort, the Airport moved forward with Phase 2 voluntary sampling. Using scientific criteria (i.e., Phase I results, groundwater flow direction, USGS reports), water wells located farther away from the Airport were tested to better determine the geographic extent to which PFAS may exist in groundwater. Phase 2 testing used the same methodology as Phase 1 testing (EPA Method 537.1). Water wells included in Phase 2 consisted of 13 residential wells, 3 utility wells, 1 irrigation well, and one surface water test. Results of Phase 2 testing were received in late September 2020. Of the 18 samples taken, 12 resulted in non-detect, and six resulted in detectable levels which were well below the 2016 EPA LHA of 70 ppt. All three utility wells (which serve multiple homes) came back as non-detect. Phase 2 testing confirmed the direction of PFAS migration from the affected area. (See **Attachment 6 – Phase 2 Testing Results**).

Phase 3 Testing. Phase 2 testing provided information regarding the direction and general extent of the PFAS plume; however, a defined non-detect boundary was not identified to the southwest. Therefore, the Airport conducted a third phase of voluntary residential well testing to gain a better understanding of the extent to which PFAS has traveled off airport property.

Approximately 144 property owners were contacted regarding the Phase 3 testing effort, of which 74 volunteered to have their domestic wells sampled. Of the 74 wells tested, no groundwater samples tested above the 2016 LHA of 70 ppt. PFOS and/or PFOA was detected in 12 samples (ranging from a total of 2.4 to 28.7 ppt). (See **Attachment 7 - Phase 3 Voluntary Residential Testing Area** and **Attachment 8 – Phase 3 Testing Results**).

In August 2021, sampling was conducted on six additional domestic water wells located adjacent to the Phase 3 testing area. All homes were located within the Moulton Loop neighborhood. In accordance with WDEQ recommendation, EPA Method 533 was used in testing the samples. All of these samples resulted in no detectable levels of PFOA and PFOS.

#### 5.4 Continued Monitoring of Residential Wells

Continued monitoring of community drinking water wells is an important element of Airport PFAS mitigation program. Therefore, a Continued Monitoring program was established to collect pre-filter samples (should there be a filter installed on a residential drinking water well) from a sample of homes within the Phase 1, 2 and 3 testing areas. The goal of continued monitoring is to



understand PFAS groundwater levels with regard to seasonality and to monitor any changes over time.

**August 2021:** 19 domestic water wells that had previously been tested were re-tested to evaluate potential trends in concentrations. Results for the 19 samples ranged from non-detect to 46ppt, all of which were well below the 2016 LHA of 70ppt. Some results were higher and some lower than previous testing.

**February 2022:** 18 domestic water wells that had previously been tested were re-tested to evaluate potential trends in concentrations. Results for all 18 samples were well below the 2016 LHA. Some results were higher and some lower than previous testing.

**August 2022:** 20 domestic water wells that had previously been tested were re-tested to evaluate potential trends in concentrations. Results were generally consistent with prior testing events, but some wells showed slight increases in PFOA or PFOS.

**February 2023:** 22 domestic water wells were tested pre-filtration system. Results were generally consistent with the previous testing events. A comparison of these results with the 2023 **proposed** MCLs for PFOS and PFOA indicated the following:

- One PFOA result exceeded 4 ppt with a maximum value of 5.5 ppt
- Thirteen PFOS results exceeded 4 ppt with a maximum value of 46 ppt

**August 2023:** 22 domestic water wells were re-tested. Results were generally consistent with the previous testing events, although concentrations were typically slightly lower. A comparison of these results with the 2023 proposed MCLs for PFOS and PFOA (e.g., 4 ppt individually for PFOA and PFOS) indicated the following:

- No PFOA results exceeded 4 ppt.
- Fourteen PFOS results exceeded 4 ppt with a maximum value of 39 ppt.

The Airport will continue to re-test these domestic and on-airport wells at least through 2024, both in wet and dry seasons, for further analysis. The next round of domestic and on-airport testing is scheduled for spring of 2024. See **Attachment 9** for Continued Residential Monitoring Results. **Attachment 10** illustrates aggregated data collected during Continued Residential Monitoring sampling events since 2020.

## **6. Mitigation Actions Taken to Protect Drinking Water Supplies**

### **6.1 Temporary Water Supplies.**

While the Airport was conducting off-airfield testing and residents awaited results, the Airport offered to supply drinking water to all users of residential wells within the Phase 1 testing area as an initial mitigation measure. Two alternatives were made available upon request of the resident. The first was the AQUA TRU Countertop Water Filtration Purification System that uses reverse osmosis technology to remove contaminants. This system is certified under National Science

Foundation (NSF) standards by the International Association of Plumbing and Mechanical Officials (IAPMO). The second alternative is bottom load 5-gallon water coolers from JH20.

At its meeting of November 18, 2020, the Airport Board decided to make a similar offer of temporary water supply to residents within the Phase 2 and 3 testing boundaries. Provision of temporary water supplies will continue until filtration systems are installed, or it is determined that no filtration systems are necessary.

## 6.2 Point of Entry Treatment (POET) Filtration Systems .

Although only one home in the Phase I testing area was found to have a PFAS concentration above EPA's 2016 70 ppt LHA, because this neighborhood is located directly adjacent to the airfield, in May 2020 the Airport Board offered to provide point of entry treatment (POET) filtration systems, upon request, for all homes located within this Phase I testing boundary, regardless of the level of PFAS detected in the well.<sup>7</sup>

At its November 18, 2020 meeting, the Airport Board authorized the prompt installation of POET water filter systems, at Airport expense, for any domestic water well in the Phase 2 or 3 areas which tests at or above 70 ppt for PFOS+PFOA. As noted above, this was consistent with EPA's 2016 LHA level for drinking water, which was relied upon by the State of Wyoming. Per Phase 2 and Phase 3 investigation results, no residential wells in the testing areas detected PFAS levels at or even approaching 70 ppt.

After completion of Phase 3 testing, the Airport sought the input of the WDEQ and the Teton County Public Health Department regarding the levels at which water filters should be installed at Airport expense in the Phase 2 and 3 areas. Both agencies responded that the applicable standard in Wyoming was the 2016 LHA level of 70 ppt. Teton County Public Health stated that if the Airport installed filters at any level lower than the EPA standard it should be considered to be a good neighbor. WDEQ also noted that if the EPA PFAS LHA level was reduced in the future (or a federal MCL established), the Airport would need to revisit the issue.

At its Special Meeting held on June 29, 2021, the Airport Board voted to offer whole-house filtration systems for installation on domestic water wells which, based on available testing data from domestic water wells, are estimated to test at or above a 10 ppt threshold for PFOA, 10 ppt threshold for PFOS, and 10 ppt threshold for combined PFOA and PFOS. An "allowance for variability" concept was authorized for use in developing the Eligibility Boundary ("EB") shown on **Attachment 11** – Eligibility Boundary Map. This would account for possible seasonal testing, and other factors contributing to variability over time.

Though the 2016 EPA LHA limit for PFOS and PFOA in drinking water was 70 ppt, and that standard was relied upon by most state environmental agencies, including the WDEQ, several states had established lower standards. A threshold of 10 ppt mirrored the most stringent

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<sup>7</sup> WDEQ informed the Airport that ongoing efforts at another Wyoming PFAS site were using the level of 35 ppt as a threshold for implementing mitigation measures. The Airport's provision of water filtration system to all homes in the Phase 1 Area was therefore far more protective.

regulatory standard adopted by any jurisdiction in the United States at the time. The Airport Board selected this threshold to best support the local community and the environment.

As noted previously, in June 2022 EPA released a revised LHA for PFOS and PFOA in drinking water (0.004 ppt for PFOA and 0.02 ppt for PFOS). After this occurred, the Airport determined to provide filters not only to those within the Eligibility Boundary, but also for any well located within an area in which it was estimated that any concentration of PFOS or PFOA would be detected in groundwater, or in which PFOS and PFOA were actually detected.

Going forward, residents whose parcels fall within the EB, or within an area in which PFAS is estimated to occur or has been actually detected, will be eligible to receive, at no cost to them, a whole-house domestic water filtration system that is certified to remove PFOS and PFOA. If any portion of a parcel is located within the EB, any domestic water well on the parcel will continue to be eligible for a filter. Water filters will be provided for domestic water wells only. It is the property owner's responsibility to request installation of a filter system. If a single residence requires more than one filter due to its size, additional system(s) will be provided and installed. The Airport Board will be issuing replacement filters cartridges to maintain effectiveness of the systems at least through 2024.

If a new residence is constructed on an eligible parcel, it may receive a filter system. The owners of new residences must submit a copy of their Teton County building permit and coordinate the timing of installation with their construction. If a parcel that falls within the EB is subdivided in the future, only new domestic water wells on newly delineated parcels where some portion is within the Eligibility Boundary will be eligible to be provided with filter systems. The owners of new residences on qualified new sub-parcels must also submit a copy of their Teton County building permit, and coordinate the timing of installation with their construction.

To date, 55 filters have been installed on 53 residential properties located within the Phase 1 testing area, and 49 filters have been installed on 28 residential properties located within the Phase 2 and 3 eligibility boundaries. This makes for a total of 104 filters installed on 81 properties to date. It is anticipated that additional filters may be installed at homeowner request.

As noted previously, the filters installed at Airport expense are certified to remove PFOS and PFOA. Spot-testing of post filtration water confirms that removal has been successful. Residential water systems on which these filters have been installed are therefore meeting the manufacturer's removal efficiencies.

## **7. Actions Taken to Investigate Soils/Materials**

A soil sampling and analytical investigation is usually a part of a comprehensive PFAS Management plan. At the Jackson Hole Airport, such an investigation has two components. The first is an investigation of source areas in which AFFF has been historically discharged on the airfield for purposes of testing, training, or response to emergency incidents. This component was addressed when the Airport conducted the MAPA evaluation discussed in Section 4 above. The

second component was necessitated by the runway replacement project which the Airport undertook in the spring of 2022.

The runway replacement project, completed in 2022, excavated soils, pavement, and associated subbase materials under and adjacent to the runway and taxiway. Some of these materials could have contained concentrations of PFAS. If not properly mitigated, their disturbance and relocation could have caused the spread of PFAS around the airfield and/or an acceleration of PFAS leaching into groundwater. A portion of this investigation focused on better understanding the concentration and extent of PFAS in the soils and within the pavement and associated subbase to be excavated for the runway reconstruction project. Based upon this investigation, it was determined that the runway project did not need to plan to minimize any excavation-related PFAS risks.

**December 2020:** Prior to airfield construction, the Airport conducted an on-site soil investigation to determine the extent to which PFAS is found in airfield soils and to identify any potential groundwater impacts. The soil investigation consisted of 28 soil borings – drilling to approximately 30 to 70 feet below ground surface, until groundwater was reached (see **Attachment 12** - Approximate Locations of Soil Borings. Soil samples were taken at four depths per borehole (0 to 5 feet, 10 to 15 feet, 25 to 35 feet, and 5 feet above the groundwater table), and then a grab groundwater sample was taken.

To evaluate the sampling results, the Airport used screening levels published by the Interstate Technology Regulatory Council (ITRC), an industry leading organization that contributes to the development of uniform national guidance and standards.

The shallowest soil data (0 to 5 feet interval), representing soils that would potentially be disturbed by the runway replacement project, was compared to the published Human Health Screening Levels (ITRC, January 2021). These screening levels are 1,260 ug/kg for PFOA and PFOS individually, and 1,300,000 ug/kg for PFBS.<sup>8</sup> These screening levels are based on residential exposure over a lifetime (approximately 70 years). In an abundance of caution, the Airport applied a safety factor of 100 to account for unknowns and provide an extra measure of protection for construction workers associated with the runway project. This resulted in using modified Human Health Screening Levels of 12.6 ug/kg each for PFOA and PFOS, and 13,000 for PFBS in evaluating the 0 to 5-foot interval results. Sampling results found no concentrations of PFOA, PFOS, or PFBS above the modified more stringent Human Health Screening Levels in the 0 to 5 feet interval in any of the 28 borings.

For soil intervals deeper than 5 feet, which would not be disturbed by construction, the ITRC Protection of Groundwater Screening Levels were used in evaluating the sampling results: PFOA (0.172 ug/kg), PFOS (0.378 ug/kg), and PFBS (130 ug/kg). Concentrations of these compounds were detected above their respective screening levels in 8 of the 28 borings at the deeper intervals. These results are consistent with previous sampling events conducted on the airfield, expand the Airport's understanding of the extent of PFAS, and support its decision to continue its PFAS

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<sup>8</sup> Note that the EPA's Lifetime Health Advisory for drinking water accounts for only PFOA and PFOS compounds. The ITRC standards for Human Health Soil Screening Level and protection of Groundwater Screening Level include PFBS, in addition to PFOA and PFOS.

investigations. The results of the soil sampling event were utilized in application of best practices which were employed during the Airport's runway replacement project in the spring of 2022 .

## **8. Future Feasibility Study for Design of Appropriate Treatment Technology**

Engineering data has been and continues to be collected from on-airfield wells to complete the process of identifying and designing the most effective groundwater remediation technology for the airport, if and when determined necessary and appropriate. The feasibility study will be completed when PFOA and PFOS remediation standards have been published by EPA, and thus when the goals of remediation have been established. The airport's consultants continue to review and monitor emerging soil and groundwater technologies for PFAS removal related to the specific geologic conditions at the airport.

## **9. Agency Coordination**

It was important to involve relevant agencies early in this process to inform them of testing results, 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. Coordination with these agencies also allows 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 also be of assistance in distributing factual information to residents.

The Airport will continue to coordinate with and keep the following agencies informed of the results of investigations made and mitigation actions taken under this Plan:

### **9.1 National Park Service.**

The Jackson Hole Airport is located in Grand Teton National Park (Park) under authorization provided by a 1983 Agreement, which has been amended four times. Among other things the Third Amendment to the Agreement requires that the Airport Board act in good faith and in coordination and cooperation with the National Park Service to develop and implement such mitigation measures as may be available to reduce environmental impacts on the Park. Consistent with this obligation, the National Park Service (NPS) was promptly informed of the Airport's well sampling results in March 2020. Periodic reports to NPS have since been made and will continue to be made as appropriate. The Airport will also include a report on PFAS related actions in its required Biennial Report to NPS.

### **9.2 Wyoming Department of Environmental Quality.**

The WDEQ is the state's regulatory agency charged with protecting, conserving, and enhancing Wyoming's land, air, and water for the benefit of current and future generations. WDEQ does this in part through agreements with EPA under which WDEQ assumes authority for enforcement of certain federal environmental laws. Neither EPA nor WDEQ have adopted any regulatory standards for the cleanup of PFAS in soil or groundwater. As noted above, EPA initially adopted a non-regulatory LHA for PFOS+PFOA in drinking water of 70 ppt. Then in June 2022, EPA

released a revised and unexpectedly low LHA which is several thousand times lower than 70 ppt, and below the level which can even be detected or measured by current technology. WDEQ continues to rely on the EPA for any regulatory standards associated with PFAS in soil or groundwater.

By letter to WDEQ on April 28, 2020, the Airport provided a *Jackson Hole Airport (JHA) Interim PFAS Report (April 28, 2020)* and sought consultation with WDEQ. The Airport has since been in periodic consultation with WDEQ in both writing and telephone conference call. The Airport desires to enter into a more formal consulting relationship with WDEQ under which its advice and consultation is sought and received. In any event, the Airport will provide reports to and seek consultation with WDEQ at appropriate times and consistent with this Plan.

### 9.3 Teton County Health Department.

The mission of the Teton County Health Department (TCHD) is to promote the health and wellbeing of the Jackson Hole community through protection and prevention efforts, in collaboration with an engaged public and other community partners. The Airport gave its first formal report to TCHD and sought its consultation by letter of October 13, 2020. The Airport will provide reports to and seek consultation with TCHD as appropriate.

### 9.4 Teton Conservation District.

The Teton Conservation District (TCD) is a special district established under Wyoming law, which is established by local residents to conserve natural resources and develop locally driven solutions for environmental concerns. Its mission is to work with the community in the conservation of natural resources for the health and benefit of people and the environment. Upon being informed of the presence of PFAS in groundwater under and surrounding the airfield, in August 2020 TCD stepped forward and awarded the Airport Board a \$40,000 grant to assist in the testing of off-airfield water wells to determine the extent of PFAS migration. This grant has assisted in making possible water testing and determining which homes should be provided with water filtration systems at Airport expense. The Airport is reporting to TCD on those test results and will provide reports to, and seek consultation with, TCD as appropriate and consistent with the terms of the grant.

In addition to the above agencies, the Airport will periodically provide reports on progress under this Plan to other agencies as and when appropriate.

## 10. Public Communication and Outreach

Throughout the investigation and implementation of this Plan, the Airport is dedicated to open and transparent communication with the public. To facilitate comprehensive public outreach, a variety of tools will be used to communicate with residents located within the area, as well as with the community at large.

#### 10.1 Communications with Affected Homeowners.

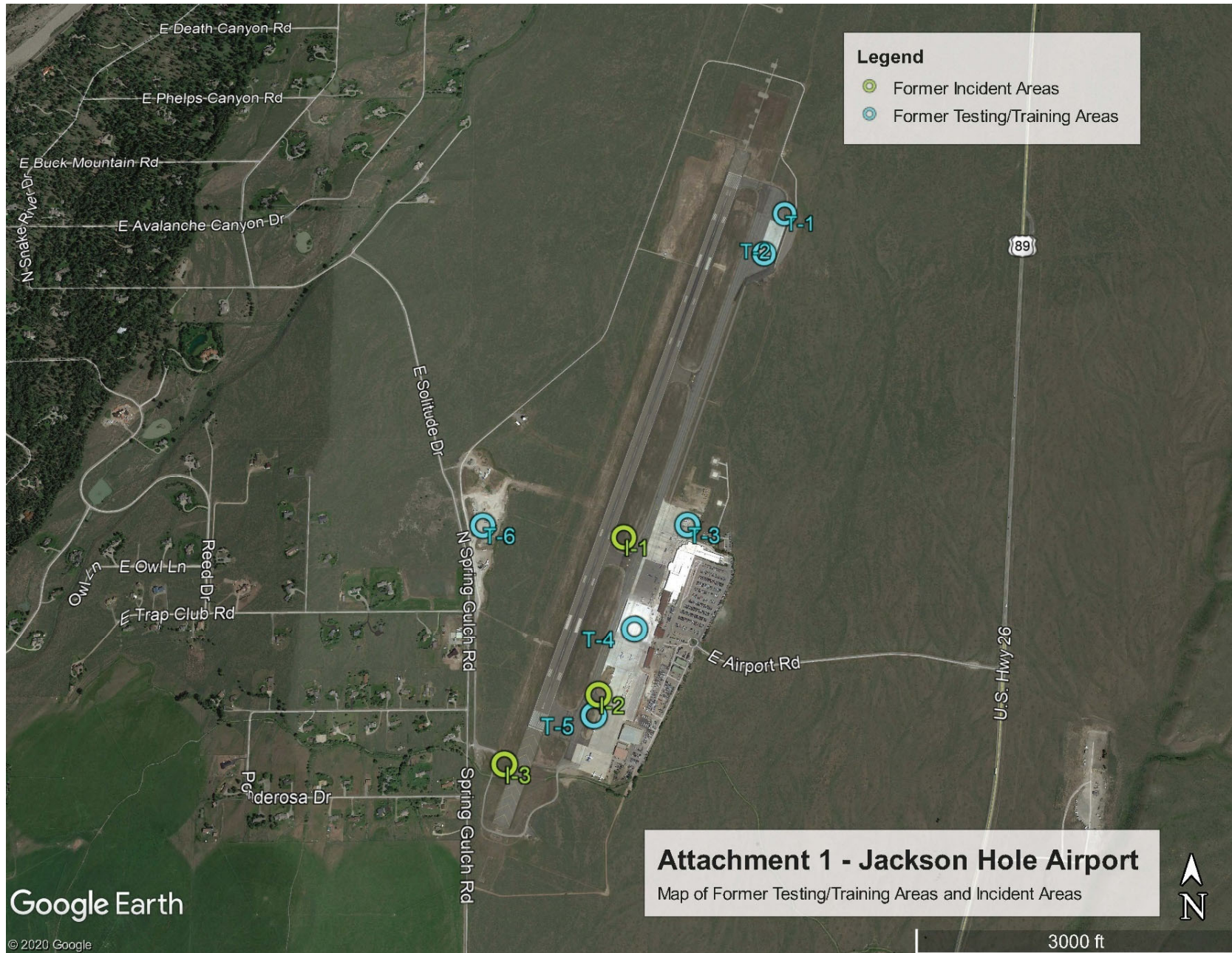
The Airport has and will continue to correspond with homeowners in the Phase 1, 2, and 3 areas through mail, email and telephone. These communications will be to schedule water testing and when appropriate retesting, arrange for temporary water supply delivery, arrange for filter system installation, and provide replacement filters for the homeowner when requested. Communications will also direct affected homeowners to the Airport's website where more detailed communication information on PFAS and this Plan may be obtained.

#### 10.2 Communication with Public at Large.

The Airport will continue to communicate with the public at large through its website postings, where detailed information on the regulatory framework of PFAS and the Airport's continued monitoring activities can be reviewed. Additionally, this Plan will be updated from time to time and can be accessed via the website. The Airport is also updating video presentations about PFAS.

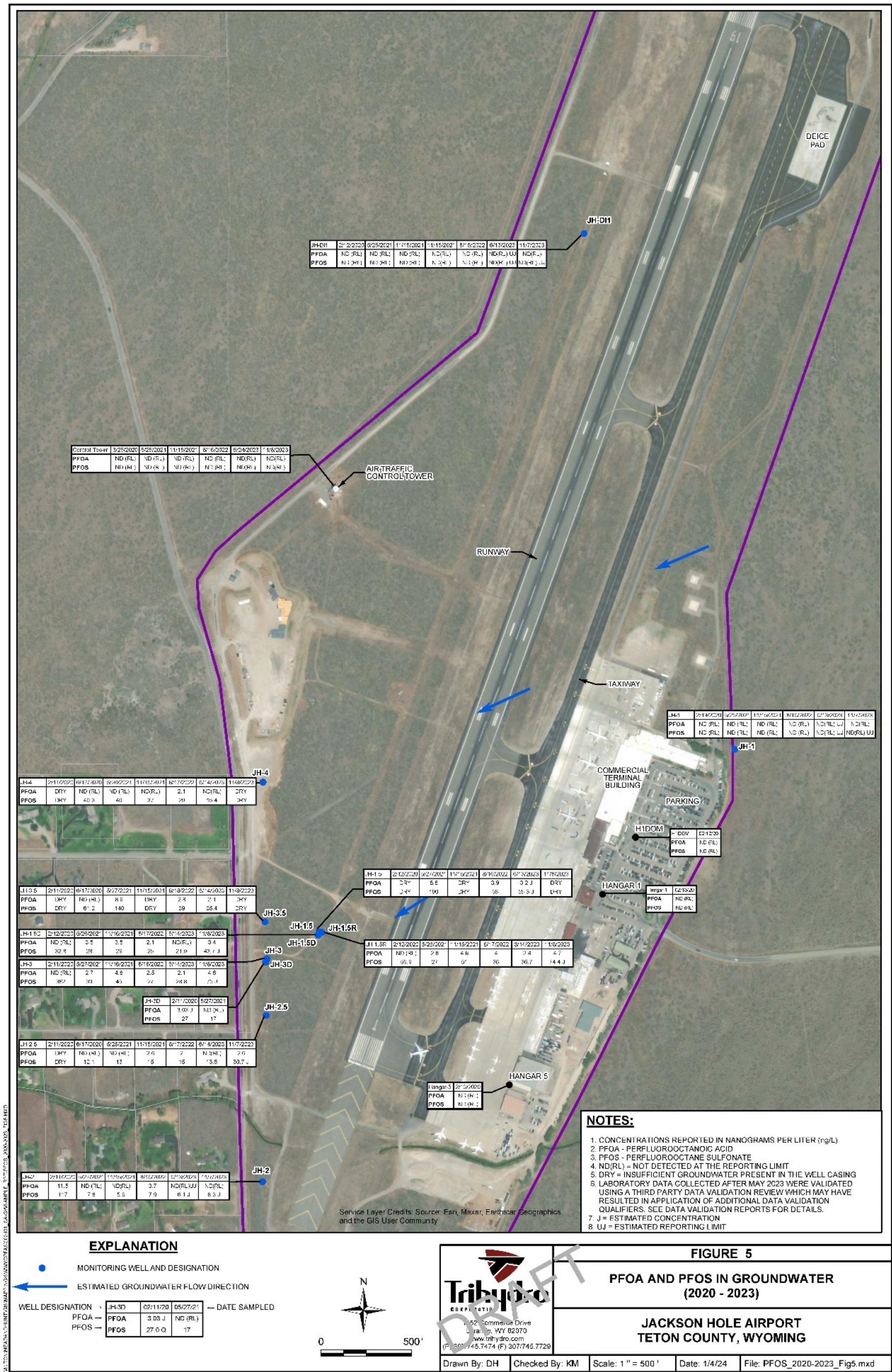


## Attachment 1: Past use of AFFF (with PFAS) at Jackson Hole Airport





Attachment 2: Jackson Hole Airport Well Cumulative PFAS Figure





**Attachment 3: Jackson Hole Airport Well Cumulative PFAS Data Table**

Well ID	Sample Date	PFOA	PFOS
		ng/L	ng/L
<b>Control Tower</b>	03/27/20	ND (RL)	ND (RL)
	05/25/21	ND (RL)	ND (RL)
	11/15/21	ND (RL)	ND (RL)
	08/16/22	ND (RL)	ND (RL)
	05/24/23	ND (RL)	ND (RL)
	11/08/23	ND (RL)	ND (RL)
<b>JH-1</b>	02/13/20	ND (RL)	ND (RL)
	05/25/21	ND (RL)	ND (RL)
	11/15/21	ND (RL)	ND (RL)
	08/16/22	ND (RL)	ND (RL)
	06/13/23	ND (RL)	ND (RL)
	11/07/23	ND (RL)	ND (RL)
<b>JH-1.5</b>	02/12/20	DRY	DRY
	05/27/21	5.8	<b>190</b>
	11/15/21	DRY	DRY
	08/18/22	3.9	<b>56.1</b>
	06/14/23	3.2 J	<b>55.3 J</b>
	11/07/23	DRY	DRY
<b>JH-1.5R</b>	02/12/20	ND (RL)	<b>55.9</b>
	05/26/21	2.8	27
	11/15/21	4.8	<b>51</b>
	08/17/22	4	36
	06/14/23	2.4	36.7
	11/08/23	4.7	<b>74.4 J</b>
<b>JH-1.5D</b>	02/12/20	ND (RL)	32.8
	05/26/21	3.5	28
	11/16/21	3.5	29
	08/17/22	2.1	25
	06/14/23	ND (RL)	21.9
	11/08/23	3.4	<b>43.7 J</b>
<b>JH-2</b>	02/11/20	11.5	<b>117</b>
	05/27/21	ND (RL)	7.8
	11/15/21	ND(RL)	5.9
	08/16/22	3.7	7.9
	06/13/23	ND (RL)	6.1 J
	11/07/23	ND (RL)	8.3 J
<b>JH-2.5</b>	02/11/20	DRY	DRY
	06/17/20	ND (RL)	12.1
	05/25/21	ND (RL)	13
	11/15/21	2.6	15
	08/17/22	2 J	15
	06/14/23	ND (RL)	13.6
	11/07/23	2.6	30.7 J
<b>JH-3</b>	02/11/20	ND (RL)	<b>382</b>
	05/27/21	2.7	39
	11/16/21	4.8	<b>45</b>
	08/18/22	2.5	27
	06/14/23	2.1	28.8
	11/08/23	4.6	<b>75 J</b>
<b>JH-3D (1)</b>	02/11/20	3.03 J	27.0 Q
	05/27/21	ND (RL)	17
<b>JH-3.5</b>	02/11/20	DRY	DRY

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	06/17/20	ND (RL)	<b>61.2 Q</b>
	05/27/21	8.9	<b>140</b>
	11/15/21	DRY	DRY
	08/18/22	2.8	39.1
	06/14/23	2.1	35.4
	11/07/23	DRY	DRY
<b>JH-4</b>	02/11/20	DRY	DRY
	06/17/20	ND (RL)	<b>40.3</b>
	05/26/21	ND (RL)	<b>40</b>
	11/16/21	ND(RL)	37
	08/17/22	2.1	29
	06/14/23	ND (RL)	15.4
	11/07/23	DRY	DRY
<b>JH-D11</b>	02/12/20	ND (RL)	ND (RL)
	05/25/21	ND (RL)	ND (RL)
	11/15/21	ND (RL)	ND (RL)
	08/16/22	ND (RL)	ND (RL)
	06/13/23	ND (RL)	ND (RL)
	11/07/23	ND (RL)	ND (RL)
<b>GW RSLs</b>		<b>60</b>	<b>40</b>

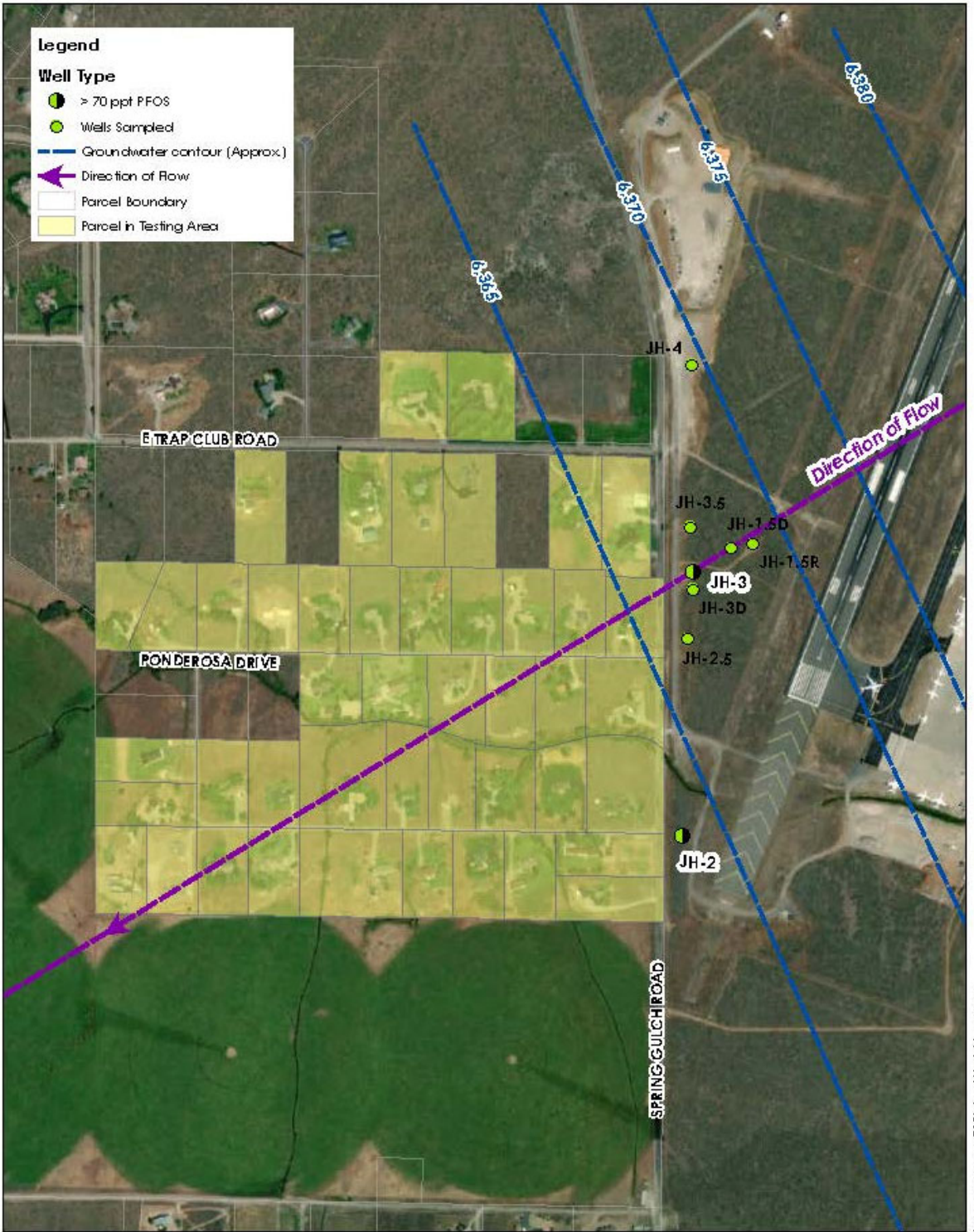
ND = Not detected above reporting limit (RL).

J and Q are qualifiers added to the data by the laboratory.

(1) - Equipment is stuck in well and water cannot be sampled.

RSL = USEPA Regional Screening Levels (RSLs, USEPA 2022a)

Attachment 4: Phase 1 Voluntary Residential Testing Area  
June 2020



Phase 1 Residential Testing Area  
Jackson Hole Airport

0 150 300 600 900 1,200 Feet



Image source: ESRI, Inc. World Imagery

Attachment 5: Phase 1 Testing Results  
June 2020

Location ID	Total PFOA and PFOS, ng/L	PFOA, ng/L	PFOS, ng/L
JW0121	30.6	1.1	29.5
JW0122	63.8	1.5	62.3
JW0127	5.8	ND	5.8
JW0128	0.7	ND	0.7
JW0129	ND	ND	ND
JW0130	11.9	0.9	11
JW0131	27.6	1.1	26.5
JW0133	40.7	1.2	39.5
JW0134	70.3	1.6	68.7
JW0135	35.9	1.4	34.5
JW0138	63.5	1.5	62
JW0139	39.3	1.1	38.2
JW0170	42.4	ND	42.4
JW0172	5.6	1.8	3.8
JW0173	1.7	ND	1.7
JW0174	ND	ND	ND
JW0183	ND	ND	ND
JW1210	ND	ND	ND
JW1213	8.1	ND	8.1
JW1215	32.4	0.7	31.7
JW1216	44.6	1.3	43.3
JW1217	44	1.3	42.7
JW1218	35.9	1.1	34.8
JW1219	22.6	1.2	21.4
JW1220	14	0.8	13.2
JW1222	12.1	0.7	11.4
JW1224	8	1.2	6.8
JW1310	35.2	1.2	34
JW1312	46.9	1.7	45.2
JW1313	26.5	1.1	25.4
JW1315	13.3	0.7	12.6
JW1316	6.2	ND	6.2
WW-201	23	ND	23
WW-202	14	ND	14
WW-203	17	ND	17
WW-204	7	ND	7
WW-205	ND	ND	ND
WW-206	35	ND	35
WW-210	24	ND	24
WW-211	42.7	2.7	40
WW-213	17	ND	17
WW-214	16	ND	16
WW-215	49.5	2.5	47
WW-217	28.2	2.2	26
WW-218	ND	ND	ND
WW-219	49.2	2.2	47
EPA, 2016 LHA	70	70	70

LHA is Lifetime Health Advisory based upon toxicology data only.  
An average-size adult (154 pounds) would need to drink 2 liters (8.5 cups) of water per day from the same unfiltered tap with PFAS concentrations above 70 ppt for a total of 70 years.

ND = not detected at the reporting limit  
ng/L = nanograms per liter, or ppt

Notes:  
PFAS = Per and Polyfluorinated Alkyl Substances  
PFAS Drinking Water by EPA Method 537.1 or 533  
PFOA = Perfluorooctanoic acid  
PFOS = Perfluorooctane sulfonate

**Attachment 6: Phase 2 Testing Results  
August 2020**

<b>Location ID</b>	<b>Total PFOA and PFOS, ng/L</b>	<b>PFOA, ng/L</b>	<b>PFOS, ng/L</b>
<b>SW-1</b>	ND	ND	ND
<b>UW-1</b>	ND	ND	ND
<b>UW-2</b>	ND	ND	ND
<b>UW-3</b>	ND	ND	ND
<b>WW-1</b>	ND	ND	ND
<b>WW-2</b>	24	ND	24
<b>WW-3</b>	22	ND	22
<b>WW-4</b>	ND	ND	ND
<b>WW-5</b>	8.5	ND	8.5
<b>WW-6</b>	ND	ND	ND
<b>WW-7</b>	ND	ND	ND
<b>WW-8</b>	47	2	45
<b>WW-9</b>	32	ND	32
<b>WW-10</b>	ND	ND	ND
<b>WW-11</b>	ND	ND	ND
<b>WW-12</b>	ND	ND	ND
<b>WW-13</b>	ND	ND	ND
<b>WW-14</b>	4.6	ND	4.6
<b>EPA, 2016 LHA</b>	70	70	70

LHA is Lifetime Health Advisory based upon toxicology data only.  
An average-size adult (154 pounds) would need to drink 2 liters (8.5 cups) of water per day from the same unfiltered tap with PFAS concentrations above 70 ppt for a total of 70 years.

**Notes:**

ng/L = nanograms per liter, or ppt

PFAS Drinking Water by EPA Method 537.1 or 533

ND = not detected at the reporting limit

UW - Utility district well

JW and WW = Residential Well water

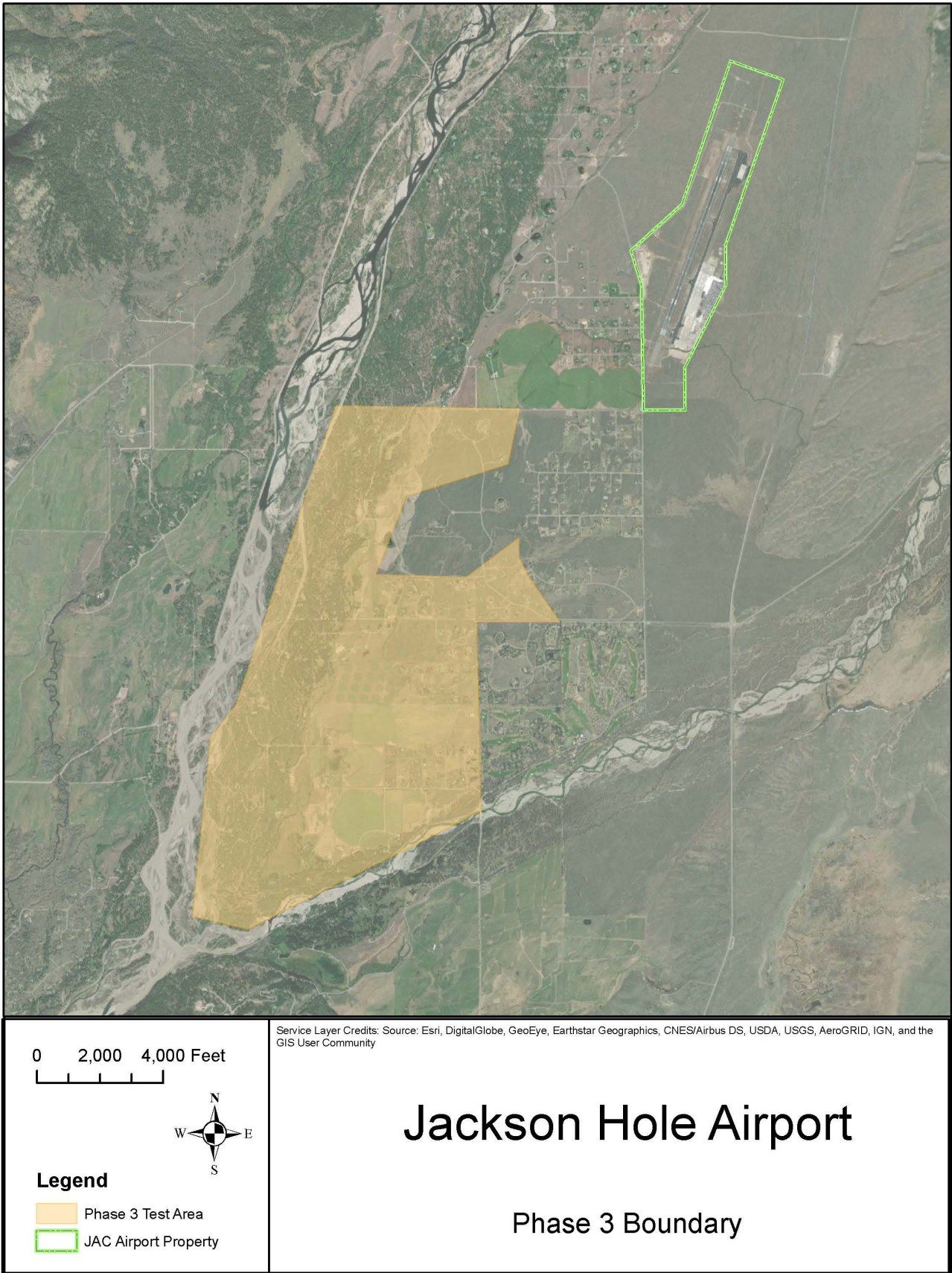
PFAS = Per and Polyfluorinated Alkyl Substances

PFOA = Perfluorooctanoic acid

PFOS = Perfluorooctane sulfonate



Attachment 7: Phase 3 Voluntary Residential Testing Area



Attachment 8: Phase 3 Testing Results  
February 2021

Location ID	Total PFOA and PFOS, ng/L	PFOA, ng/L	PFOS, ng/L
WW-3002	ND	ND	ND
WW-3003	ND	ND	ND
WW-3006	ND	ND	ND
WW-3008	ND	ND	ND
WW-3009	ND	ND	ND
WW-3010	ND	ND	ND
WW-3012	ND	ND	ND
WW-3013	ND	ND	ND
WW-3014	ND	ND	ND
WW-3015	ND	ND	ND
WW-3016	ND	ND	ND
WW-3018	ND	ND	ND
WW-3021	ND	ND	ND
WW-3022	4.7	ND	4.7
WW-3024	ND	ND	ND
WW-3027	ND	ND	ND
WW-3031	2.4	ND	2.4
WW-3032	ND	ND	ND
WW-3035	ND	ND	ND
WW-3036	ND	ND	ND
WW-3037	ND	ND	ND
WW-3038	ND	ND	ND
WW-3039	ND	ND	ND
WW-3042	ND	ND	ND
WW-3044	ND	ND	ND
WW-3046	ND	ND	ND
WW-3047	ND	ND	ND
WW-3048	ND	ND	ND
WW-3049	ND	ND	ND
WW-3050	ND	ND	ND
WW-3053	ND	ND	ND
WW-3057	ND	ND	ND
WW-3059	ND	ND	ND
WW-3063	ND	ND	ND
WW-3064	ND	ND	ND
WW-3065	10	ND	10
WW-3066	ND	ND	ND
WW-3077	17.4	2.4	15
WW-3082	ND	ND	ND
WW-3085	ND	ND	ND
WW-3087	ND	ND	ND
WW-3089	ND	ND	ND
WW-3090	ND	ND	ND
WW-3091	ND	ND	ND
WW-3092	ND	ND	ND
WW-3095	ND	ND	ND
WW-3096	ND	ND	ND
WW-3097	ND	ND	ND
WW-3098	ND	ND	ND
WW-3099	ND	ND	ND
WW-3118	ND	ND	ND
WW-3119	4.3	ND	4.3
WW-3119	6.7	ND	6.7
WW-3120	23	ND	23
WW-3122	ND	ND	ND
WW-3124	ND	ND	ND
WW-3128	ND	ND	ND
WW-3129	ND	ND	ND
WW-3131	ND	ND	ND
WW-3134	ND	ND	ND
WW-3135	ND	ND	ND
WW-3139	28.7	2.7	26



WW-3141	10	ND	10
WW-3143-D	6.8	ND	6.8
WW-3143-S	ND	ND	ND
WW-3149	ND	ND	ND
WW-3150	ND	ND	ND
WW-3151	ND	ND	ND
WW-3152	ND	ND	ND
WW-3153	ND	ND	ND
WW-3154	14	ND	14
WW-3155	ND	ND	ND
WW-3158	16	ND	16
WW-3159	23	ND	23
WW-3160	ND	ND	ND
WW-401	ND	ND	ND
WW-402	ND	ND	ND
WW-403	ND	ND	ND
WW-404	ND	ND	ND
WW-405	ND	ND	ND
WW-406	ND	ND	ND
EPA, 2016 LHA	70	70	70

LHA is Lifetime Health Advisory based upon toxicology data only. An average-size adult (154 pounds) would need to drink 2 liters (8.5 cups) of water per day from the same unfiltered tap with PFAS concentrations above 70 ppt for a total of 70 year.

Notes:

ng/L = nanograms per liter, or ppt

PFAS Drinking Water by EPA Method 537.1 or 533

ND = not detected at the reporting limit

WW = Residential Water Well

D - deep well; S - shallow well

PFAS = Per and Polyfluorinated Alkyl Substances

PFOA = Perfluorooctanoic acid

PFOS = Perfluorooctane sulfonate

Attachment 9: Continued Residential Monitoring Results

Sample ID	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS	Total PFOA + PFOS
<i>Date</i>	<i>Apr-20</i>	<i>Jun-20</i>	<i>Aug-20</i>	<i>Feb-21</i>	<i>Aug-21</i>	<i>Feb-22</i>	<i>May-22</i>	<i>Aug-22</i>	<i>Feb-23</i>	<i>Aug-23</i>
WW- 208	60.2	27.6			19.0	37.3		25.2	31.3	16.0
WW-207		70.3			46	46.5		53.9	43.5	41.8 J-
JW0173		1.7			2.1	1 J		3.14 J	1 J	2.5
WW-216		44.6			24	50.1		30	49.4	28.5 J-
WW-14 TC			4.6		3.5	ND				2.9
WW-14 MH								18.1	19.1 J	13
WW-204			7		7.1	7.72 J		8.9 J	8.09 J	6.3
WW-3			22		18	19.1 J		21.5	20.3 J	15
WW-3022				4.7	11.4	5.83 J		11.2 J	6.7	6.7
WW-3064				ND		0.96 J		1.77 J	1.1 J	ND
WW-3065				10	5.2	ND		9.0 J	13.3 J	6.2
WW-3077				17.4	14.9	0.7 J		5.7 J	4.1	2.6
WW-3119				4.3	6.7	10.77 J		12.9	13.95 J	7.3
WW-3139				28.7	30.4		40*	31.6	24.3	25
WW-3141				10	10		11.6*	15.5 J	11	11
WW-3143N				6.8	5.4	5.82 J		8.7 J	7.35 J	7.6
WW-3159				23		20.95 J		21.9 J	20.4 J	15
WW-9			32		25		15 *	27.4	18.2 J	18
WW-7			ND						ND	ND
WW-3027				ND					0.79 J	
WW-3031				2.4	ND	ND		2.3 J	1.9 J	ND
WW-3050				ND					ND	
WW-6585										ND
WW-401				ND		ND			ND	ND
JW1213		8.1			8.1	7.19 J		8.1 J		
WW-3155				ND		ND		0.77 J		
WW-3120				23	21					
JW-0172		5.6			ND					
<i>EPA, 2016 LHA</i>	<i>70</i>	<i>70</i>	<i>70</i>	<i>70</i>	<i>70</i>	<i>70</i>	<i>70</i>	-	-	-
<i>EPA, 2022 LHA</i>	-	-	-	-	-	-	-	0.004 - PFOA 0.02 - PFOS	-	-
<i>EPA, 2023 proposed MCLs</i>	-	-	-	-	-	-	-	-	4 - PFOA 4 - PFOS	4 - PFOA 4 - PFOS

LHA is Lifetime Health Advisory based upon toxicology data only. An average-size adult (154 pounds) would need to drink 2 liters (8.5 cups) of water per day from the same unfiltered tap with PFAS concentrations above 70 ppt for a total of 70 years.

MCLs = Maximun Contaminant Levels for drinking water. Federally enforceable standard when promulgated.

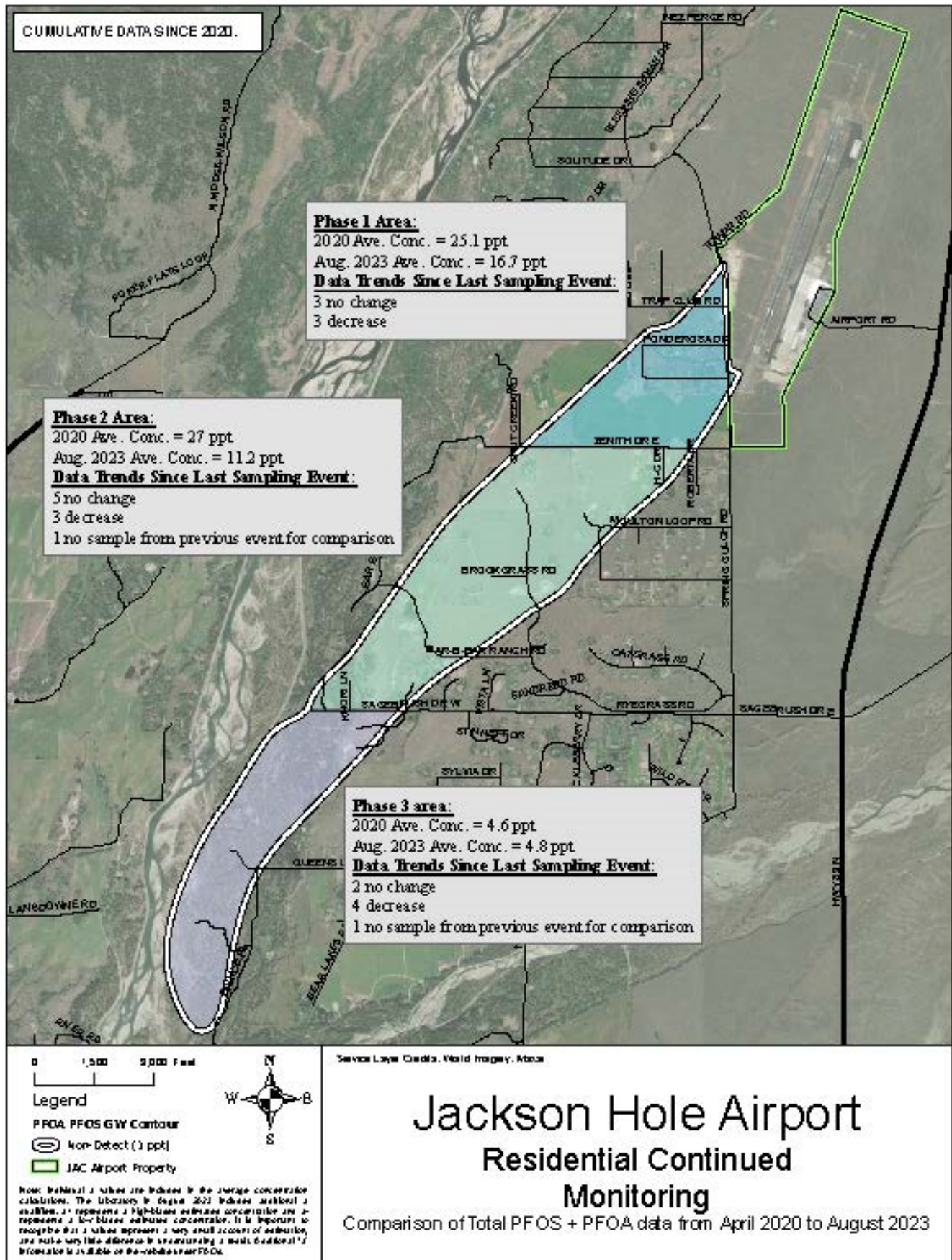
Blank spaces indicate not sampled.

\* Repeat of Feb 2022 testing

Qualifier J - value is estimated between reporting limit and method detection limit. J- = estimated concentration biased low.

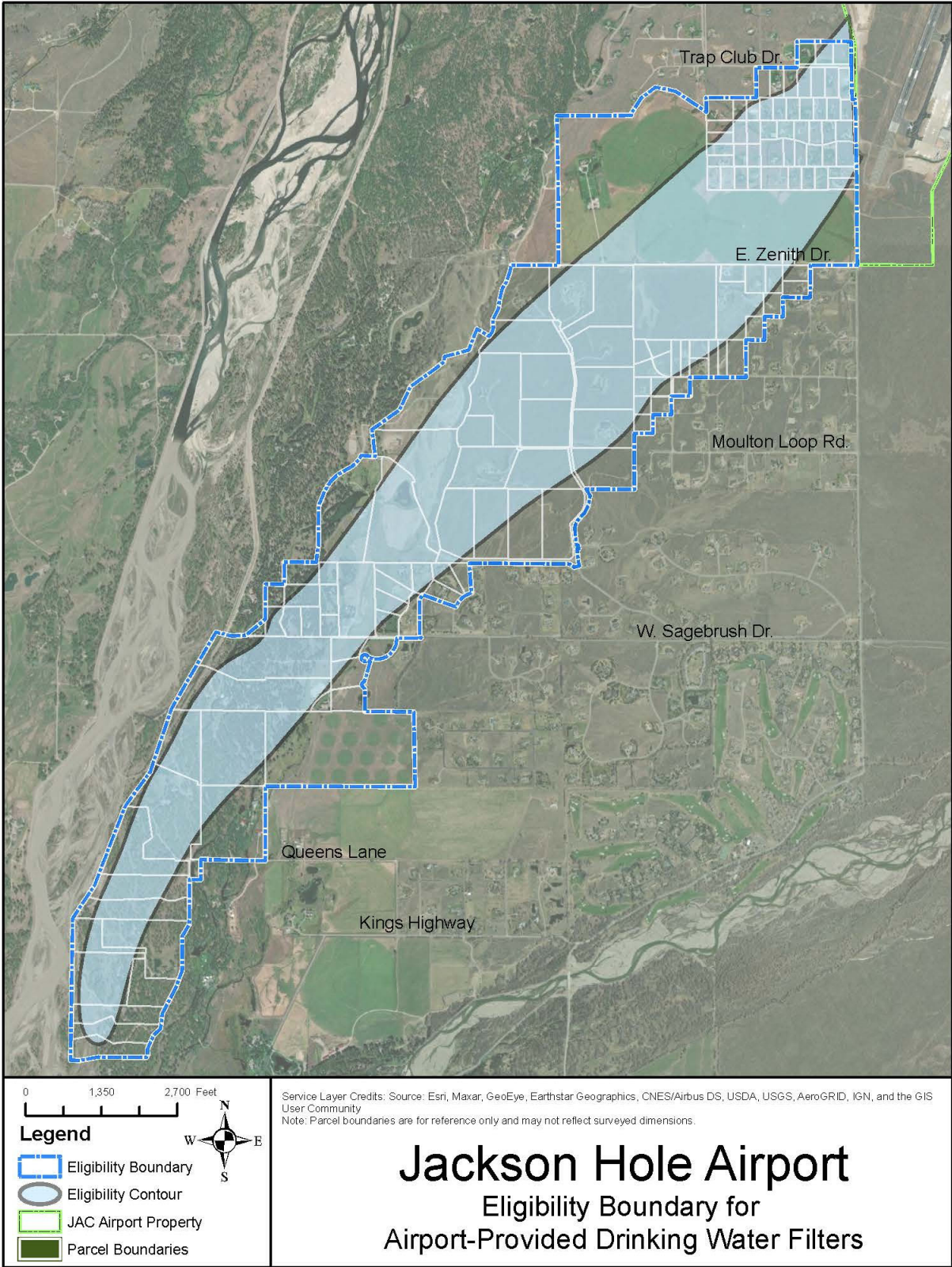
NO LONGER IN ROTATION.

# Attachment 10: Continued Residential Monitoring – Aggregated Data Updated





Attachment 11: Eligibility Boundary Map





## Attachment 12: Approximate Locations of Soil Borings

