

The Site is located within a Current Drinking Water Source Areas, designated as Zone 2's to various public drinking water supply wells include the Maher wellfield, located southeast of the Airport.

8.0 CONCEPTUAL SITE MODEL AND PHASE II SCOPE OF WORK

Assessment activities conducted to date have been completed for the IRA and this Phase 1 Report. Data collected to date provides initial information to develop a Conceptual Site Model (CSM) for planning a Phase II Comprehensive Site Assessment (CSA) in accordance with 310 CMR 40.0830. The Tier Classification submittal criteria require the preparation of a Phase II CSA scope of work or conceptual scope of work. The Phase II scope of work is provided below, with each compound addressed individually and each site for PFAS investigation discussed separately.

8.1 Conceptual Site Model

The purpose of this investigation is to evaluate the nature and extent of the release(s) including potential sources of 1,4-dioxane and PFAS compounds and risks including potential impacts to groundwater quality in the vicinity of the Airport. Soil contamination identified in source areas also presents a potential exposure point that requires risk evaluation. The potential exposure points for groundwater impacts are the public water supply wells operated at the Maher wellfield by the Hyannis Water District.

1,4-dioxane has not been detected in groundwater on the Airport property. It has only been found on the Maher wellfield property at the base on the aquifer, approximately 80 feet below the water table.

PFAS compounds have been detected at elevated concentrations in two areas; the deployment area and adjacent to the ARFF building. Concentrations of PFOS/PFOA in shallow groundwater below these two locations exceed the 0.07 ug/L standard for PFOS/PFOA. Samples collected from the deep wells on the Maher wellfield exceed the standard as well. This deep contamination may be associated with the Barnstable Fire Training Academy as shallow groundwater below the Airport's deployment area and ARFF building is not likely to migrate to the depth where PFOS/PFOA was detected at the Maher well field. Further hydrogeologic analysis of this issue will be conducted as part of the Phase II investigations.

Sampling of a third potential AFFF site, where training was conducted once in 1991, indicated that PFOS/PFOA was present, but at much lower concentration than detected at the other two Airport sites. Samples collected from other locations at the Airport and in nearby locations off the Airport property were submitted for laboratory analysis to assess background concentrations. Sample results are expected in mid-late November

2017. The results of these background samples will be used to evaluate the PFOS concentrations in soil at the 1991 training site.

1,4-Dioxane

The sampling of 1,4-dioxane to date was designed to evaluate if the presence of this contaminant in the vicinity of the Maher wellfield was associated with the former solvent plume that originated at the north ramp of the Airport. Laboratory results of samples collected from wells located within the flow pathway of this plume did not show the presence of any 1,4-dioxane (Figures 4 and 9). This includes wells selected to match how the plume would have migrated deeper into the aquifer as it moved downgradient.

1,4-dioxane was only found in samples collected from deep wells (OW-9DD, OW-18D and OW-19D) on top of a clay layer at the base of the aquifer on the Maher well field property (Figures 4 and 9). 1,4-dioxane was not detected in samples taken from monitoring wells on the Airport. A potential source of 1,4-dioxane is the former Freon plume that originated at the Packaging Industries site, upgradient of the Airport. The plume from this release flowed across the Airport and was traced to the Maher wellfield in past investigations. The installation of an additional deep well in the runway safety area, upgradient of the Maher wellfield, will help evaluate if any 1,4-dioxane is present on the Airport property and continuing to migrate from this upgradient source (Figure 4). Sampling of this new well and the deep wells on the Maher well field property for Freon-11 as well as 1,4-dioxane will help evaluate this second potential source.

PFAS Compounds

Background Concentrations

As mentioned earlier in this report, samples have been collected from ten sites on Airport property and in nearby areas to investigate the background concentrations of PFAS compounds in soil in the vicinity of the Airport. The laboratory results will be available in mid-late November 2017. They will be used to evaluate background conditions relative to the PFAS concentrations detected at the three known potential release areas at the Airport. In addition, an SPLP Leaching test using soils excavated from beside Runway 15/33 is currently being conducted and this will help evaluate the potential impacts to groundwater from PFAS compounds in soil. The SPLP test results are expected in mid-late November.

Deployment Area

AFFF was used during periodic drills and regular compliance training in an area on the East Ramp of the Airport (Figure 6). PFAS from the AFFF remains in soil in this area and is likely leaching to groundwater. During a phased sampling approach, PFAS compounds

were detected in soil samples collected at the ground surface and down to four feet below ground surface, and may extend further down in the soil column. It should be noted that several samples at the surface and at depth did not show the presence of PFAS. However, additional sampling is needed to define the horizontal and vertical extent of PFAS compounds in soil for this site, with sampling planned across the taxiway to the west in open areas to the northeast of the deployment area. Sampling below the East Ramp south of the deployment area is also planned to determine if foam that was sprayed onto the pavement might have washed through cracks into the underlying soil. Finally, sampling of sediment in leaching catch basins in the paved area just to the east of the deployment area is needed to determine if runoff into these structures is a source of groundwater contamination.

Shallow groundwater underneath the deployment area contains PFAS compounds above the 0.70 ug/L groundwater standard. Monitoring wells downgradient of the deployment area will be installed as part of the Phase II analysis to map the downgradient flow of groundwater from the deployment area towards the Maher well field. Multi-level well clusters will also be installed and tested to differentiate contamination from deployment area from that which might be related to the Fire Training Academy. The intent of these clusters is to fully assess the presence or absence of AFFF horizontally and vertically in groundwater.

ARFF Building

The practice of AFFF spraying, deployment, or use next to the ARFF building is not part of normal practice or procedures. However, it is possible that the storage and/or transfer of AFFF or the use of the vehicles General equipment maintenance and cleaning activities outside the ARFF building may have contributed to PFAS contamination in soils to the northeast of the building. Runoff into the catch basins on the north side of the building may have also provided a conduit to groundwater in this area. The Phase II analysis will include additional soil and groundwater testing to confirm the extent of soil contamination, and the impacts to groundwater.

The presence of PFAS in monitoring well HW-3 in what is referred to as “the Steamship Authority parking lot” (Figure 7) may be related to activities adjacent to ARFF in that HW-3 is downgradient of the ARFF building. Additional soil testing in the parking lot may be needed to evaluate the presence or absence of PFAS in the shallow soils in that area.

Additional surface, depth, and catch basin sediment samples will be collected at this site to further define the PFAS boundaries. A monitoring well cluster with shallow, intermediate and deep screens will be installed north of the ARFF building to evaluate groundwater contamination at depth and determine if this site could be a source of the contamination in the deep wells at the Maher wellfield property. Additional shallow monitoring wells will also be installed and sampled for PFAS compounds (Figure 5) at the

source area and downgradient to confirm the extent of contamination in groundwater in this area.

1991 Deployment Drill Location

Airport staff identified an area near the west end of Runway 15/33 where a drill using AFFF was conducted (Figure 3). An initial sample from this location contained low concentrations of PFOS and PFOA (0.4 ug/kg and 0.2 ug/kg respectively). The need for further investigation of this area will be determined based on the results of the background testing and the SPLP leaching test for which results are expected in mid-late November. If necessary and appropriate, soil and groundwater assessments will be completed in this area.

Upgradient Boundary of Airport

Although PFAS constituents are widely used, there is no identified source of PFAS near wells HW-1. PFAS in groundwater here could potentially be associated with an off Airport source. Testing of soils adjacent to the monitoring wells, and on the upgradient Kmart Plaza, may help identify the source and extent of contamination in this area of the Airport.

Well HW-19

There is no identified source of the PFAS compounds detected in well HW-19. Sampling of the soils in the vicinity of the well may help determine if the source is local or related to an off Airport release.

Well HW-1 and HW-5

Soil, surface water, and groundwater samples will be taken in the vicinity of these two wells to evaluate potential sources of PFAS compounds impacting groundwater within this area. Additional sample locations upgradient of the Kmart Plaza property will also be evaluated.

When appropriate, a Phase II CSA Completion Report and Risk Evaluation will be prepared to document information obtained as a result of any additional CSA activities and reference and incorporate the elements of this Phase I Report, and may be combined with a Phase III Remedial Action Plan. The Phase II CSA Completion Report and Phase III Remedial Action Plan will be prepared and submitted prior to the initiation of any Comprehensive Response Actions.