# Data Summary Report for the Supplemental Scope of Work

***Regional Air Deposition Study for the Village of Hoosick Falls***

September 2022


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50 Century Hill Drive
Latham, NY 12110

BEC Engineering and Geology, P.C.

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# Contents

## List of Figures



## List of Tables



## List of Appendices

## Acronyms

| | |
|---|---|
| 6:2 FTS | 6:2 fluorotelomer sulfonic acid |
| 8:2 FTS | 8:2 fluorotelomer sulfonic acid |
| bgs | below ground surface |
| DOH | Department of Health |
| DUSR | Data Usability Summary Reports |
| GPS | global positioning system |
| ITRC | Interstate Technology Regulatory Council |
| N-MeFOSAA | N-methyl perfluorooctanesulfonamidoacetic acid |
| mph | miles per hour |
| N-EtFOSAA | N-ethyl perfluorooctanesulfonamidoacetic acid |
| NRCS | Natural Resources Conservation Service |
| NYSDEC | New York State Department of Environmental Conservation |
| OU | operable unit |
| PFAS | per- and polyfluoroalkyl substances |
| PFBA | perfluorobutanoic acid |
| PFBS | perfluorobutanesulfonic acid |
| PFCA | perfluoroalkyl carboxylic acid |
| PFDA | perfluorodecanoic acid |
| PFDoA | perfluorododecanoic acid |
| PFDS | perfluorodecanesulfonic acid |
| PFHpA | perfluoroheptanoic acid |
| PFHpS | perfluoroheptanesulfonic acid |
| PFHxA | perfluorohexanoic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctane sulfonate |
| PFOSA/FOSA | perfluorooctanesulfonamide |
| PFPeA | perfluoropentanoic acid |
| PFSA | perfluoroalkane sulfonic acid |
| PFTA | perfluorotetradecanoic acid |
| PFTriA | perfluorotridecanoic acid |
| PFUnA | perfluoroundecanoic acid |
| ppb | parts per billion |
| QAPP | Quality Assurance Project Plan |
| SGPP | Saint-Gobain Performance Plastics |
| SPLP | Synthetic Precipitation Leaching Procedure |
| TOC | total organic carbon |
| USDA | United States Department of Agriculture |

# 1 Introduction

The New York State Department of Environmental Conservation (NYSDEC) requested a regional air deposition study in the Hoosick Falls area to evaluate the potential for per- and polyfluoroalkyl substances (PFAS), particularly perfluorooctanoic acid (PFOA), to have been dispersed in the environment through the air deposition pathway. This data summary report includes a summary of the methods, data, and results of the work completed under the NYSDEC-approved Supplemental Scope of Work: Regional Air Deposition Study (Supplemental Scope; C.T. Male/BEC, 2021). Findings from the initial scope of work were presented and submitted to NYSDEC in the Data Summary Report: Regional Air Deposition Study (C.T. Male/BEC, 2022). The datasets from both phases of the study are combined in this report for the purposes of data evaluation.

The study was undertaken in accordance with the NYSDEC Order on Consent and Administrative Settlement between Saint-Gobain Performance Plastics (SGPP), Honeywell International (the Companies), and NYSDEC (Index No. CO 4-20160212-18), dated June 3, 2016, and DER10 – Technical Guidance for Site Investigation and Remediation (NYSDEC, 2010). There are several facilities associated with numerous owners and operators in the Hoosick Falls area which utilized PFAS-containing material over several decades, some of which have yet to be investigated. Therefore, the air deposition study was not originally associated with any single facility or party. Rather, it was to be used to supplement and inform investigations for one or more NYSDEC Class 2 and/or Class P sites in the Hoosick Falls area (C.T. Male, 2019). However, following the initial scope of work, NYSDEC formally established Operable Units (OUs) for the McCaffrey Street Site (DEC Site #442046), located in the Village of Hoosick Falls (Village). The McCaffrey Street Site Operable Unit 03 (OU-03) "includes off-site contamination related to atmospheric deposition of site-related contaminants and direct off-site disposal of site-related liquid and/or solid waste (NYSDEC, 2021)." Accordingly, the study is being used to further define the nature and extent of PFAS in the Hoosick Falls Region resulting from air deposition of PFAS from the McCaffrey Street Site under OU-03.

## 1.1 Study Phases and Objectives

The study was conducted in two phases—an initial phase and a supplemental phase. For the initial phase, a Regional Air Deposition Study Work Plan for the Village of Hoosick Falls (Initial Work Plan; C.T. Male, 2019) was prepared and submitted to the NYSDEC. The Initial Work Plan was approved by NYSDEC on September 3, 2019. The objective of the initial phase was to determine whether the presence of PFAS was observable and consistent with an air deposition pattern in historically undisturbed soils surrounding the Village. The initial phase of work consisted of 171 soil samples (plus field duplicates) collected from 57 individual sampling locations and a subset of 45 samples submitted for Synthetic Precipitation Leaching Procedure (SPLP) analysis followed by PFAS analysis. All sample locations were carefully vetted to be representative of air deposition and avoid other potential sources/transport pathways in accordance with the Initial Work Plan. The initial study area was designed as a 1,000- to 3,000-foot radial zone beyond the Village and its infrastructure (i.e., municipal water supply and municipal sewer service areas), with sample locations as far as two miles (or 3,000 meters) from the approximate centroid of the Village. This initial sampling area was divided into 16 sectors, as shown on Figure 1, to correlate with the display of wind

conditions by direction on a wind rose. The results from the initial phase indicated that air deposition of PFAS from sources within the Village is observable in historically undisturbed soils outside of the Village. The final NYSDEC-approved data summary report (C.T. Male/BEC, 2022) for the initial phase of work includes the initial results and evaluation of those results. A brief discussion of the initial phase of work is included in Section 1.5 of this report.

Following the initial phase of study, a work plan for the Supplemental Scope was prepared and submitted to the NYSDEC. Approval to proceed with the Supplemental Scope work plan was provided by NYSDEC on August 27, 2021. Access agreements were initiated and field work began shortly thereafter. The objective for the Supplemental Scope was to further define the nature and extent of PFAS in shallow soils in the Hoosick Falls Region resulting from air deposition. The sampling area of the Supplemental Scope was extended an additional 7,000 feet (approximately 2,100 meters) from the outer limits of the initial study area, as shown on Figure 1, with sample locations as far as three miles (or 4,700 meters) from the approximate centroid of the Village. The sample location vetting and selection process and soil sampling procedures from the initial phase were replicated as discussed herein. Samples were collected in all directions with goals of identifying sample locations at a variety of distances from the Village and with a higher density of sampling locations in the predominant upwind (i.e., northwest) and predominant downwind (i.e., southeast) directions. The larger number of sample locations in the northwest sector were designed to provide a more robust dataset which could serve as a proxy for regional background. The larger number of samples in the southeast sector were designed to provide a more robust dataset for comparison with other directions and evaluate the PFAS concentration gradients with distance.

Sampling for the Supplemental Scope was completed in June 2022 and fully validated data were received in July 2022. The results and evaluation of the Supplemental Scope are presented within Section 3 of this report, and much of the evaluation utilizes the data from both the initial and supplemental phases of the study (Section 4).

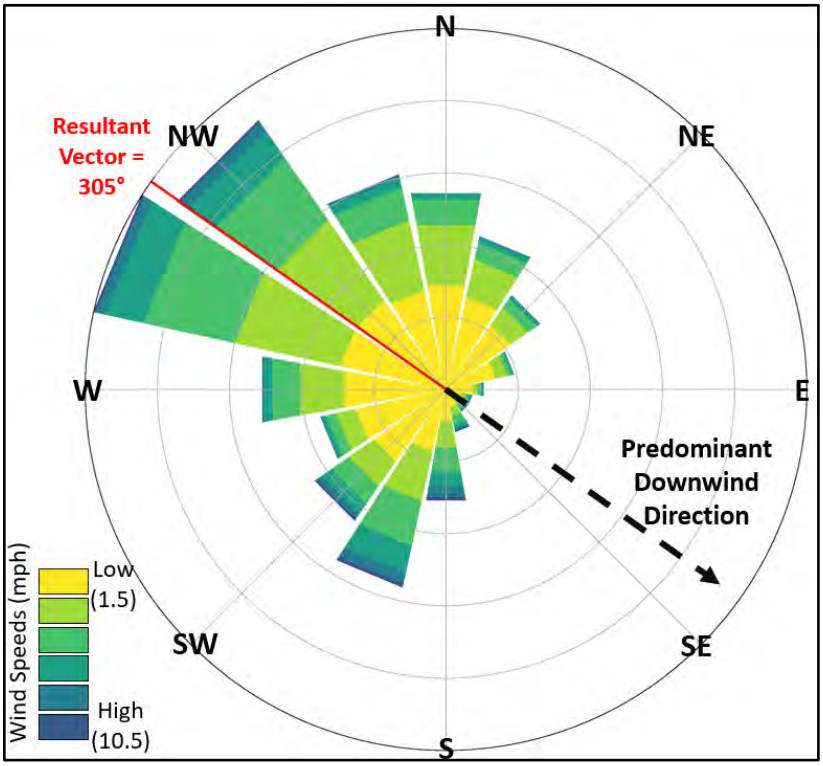
## 1.2 Study Area Topography and Wind Pattern

The Village is approximately centered in the Town of Hoosick, in northeastern Rensselaer County, New York (Figure 1). For ease of reference, the Village and surrounding areas are collectively referred to as the "Hoosick Falls Region" or "Region" in this document. The Hoosick Falls Region is location primarily within the Town of Hoosick and centered around the Village, as shown on Figure 1.

The Region includes part of the Taconic Mountains upland province (Lafleur and Ellis, 1988; USDA and NRCS, 2011) and two major river valleys—those of the Hoosic and Walloomsac Rivers. The Village is divided by the Hoosic River, which flows generally south to north in the Region. Approximately three-quarters of the Village lies east of the Hoosic River. The Walloomsac River flows generally east to west in the northern portion of the Region. Ground surface elevations are approximately 400 to 450 feet above mean sea level along the rivers and rise to more than 800 feet above the rivers in the surrounding uplands (Figure 2). Additional details on the Region's weather, hydrology, geology and hydrogeology are presented in the initial data summary report (C.T. Male/BEC, 2022).

The initial phase of the Regional Air Deposition Study included the installation of a weather station on the rooftop of the McCaffrey Street facility in November 2018 to gather meteorological data that represented conditions at the McCaffrey Street facility. This weather station has been collecting data since its installation and provides the only available weather data for the Village. Additional details on the weather station, data collection, operation and maintenance are included in the Initial Work Plan (C.T. Male, 2019) and the initial data summary report (C.T. Male/BEC, 2022).

Wind roses (including cumulative and seasonal wind roses) generated over 3.5 years, from the McCaffrey Street Weather Station (Weather Station) between December 2018 and June 2022, are included in Appendix A. A simplified summary wind rose is also included as Graphic 1. Resultant wind direction, or average wind direction, is included as a red line on the wind roses. Note that wind speeds of less than 1.5 miles per hour (mph; e.g., calm) are not displayed with an associated wind direction. For example, approximately 30% of the recorded wind speeds at the Weather Station were less than 1.5 mph. These calm conditions are included in the table with each wind rose but are not presented graphically on the wind rose.




**Graphic 1**: Wind Rose for McCaffrey Weather Station

Based on the wind roses for the Weather Station, the prevailing wind direction in the vicinity of the Weather Station is predominantly from the northwest toward the southeast. Note that these updated wind roses demonstrate consistency with those previously presented (C.T. Male/BEC, 2022). There is no other available meteorological data from within the Village and valley; therefore, the data from the McCaffrey Street station are assumed to be representative of the Village and valley for the purposes of the evaluations within this report.

## 1.3 PFAS Distribution from Air Deposition

The central concept of this study is that PFAS mass deposition decreases in all directions with distance from an air emissions source and is greatest in the prevailing downwind direction from an air emissions source. The pattern and magnitude of air deposition resulting from air emissions are dependent on several factors, including emission rates through time (emission history); pollutant characteristics (e.g., gas or particle, particle size distribution, particle density); source characteristics (e.g., air emissions through a stack or vent, emission velocity, source height, and temperature); meteorological conditions (e.g., wind

speed, wind direction, and atmospheric stability) during the time of air emissions; and various other factors (e.g., building downwash effects, vegetation, and topography) that influence air transport and deposition.

Although many of these factors (e.g., air emissions histories, stack/vent heights, or building downwash) are not fully understood throughout the Region, this does not undermine the main concept that long-term meteorological conditions influence regional-scale air deposition patterns; that is, greater deposition closer to the source (i.e., decreasing PFAS concentrations in soil with distance in any direction) and greater deposition in the prevailing downwind direction from air emissions sources (i.e., higher PFAS concentrations in soil in the southeast compared to other directions at similar distances). As stated previously, the Supplemental Scope was designed to provide samples in all directions at a variety of distances and denser sampling in the predominant upwind (i.e., northwest) and predominant downwind (i.e., southeast) directions. Given the objective, to further define the nature and extent of PFAS in shallow soils potentially resulting from air deposition, much of the evaluation within this report focuses on distribution patterns of PFAS in soil with direction and distance.

## 1.4 PFAS Fate and Transport in Soil

Like most solutes, PFAS deposited on the ground surface are subject to downward migration with infiltrating water (i.e., precipitation). PFAS distribution in soil is complex and may reflect the physical and chemical properties of each PFAS and several site-specific factors such as total organic carbon (TOC), particle surface charges, interfaces between different phases (e.g., the air-water interface), time since deposition, climate, and infiltration rates.

Data regarding physical and chemical properties of PFAS are generally limited, highly variable, based on modeling rather than direct measurements, and are based on acid forms of PFAS not present in the environment (ITRC, 2022). However, PFAS commonly detected in the Region are understood to be highly soluble in water, adsorb poorly to materials with low organic content, mobile in groundwater, and persistent in the environment (ITRC, 2022).

The migration of PFOA and other PFAS in soil has been shown to be controlled primarily by adsorption onto organic matter, specifically organic carbon (Zareitalabad, et al., 2013). Longer-chained PFAS have a higher partition coefficient with regard to organic carbon, resulting in lower mobility within the soil column (ITRC, 2022). Therefore, compared to PFOA (eight carbons in each molecule), perfluorododecanoic acid (PFDoA; 12 carbons in each molecule) and other long-chain linear PFAS migrate through soil columns more slowly than PFOA. Conversely, perfluoropentanoic acid (PFPeA; five carbons in each molecule) migrates more rapidly through soil columns than PFOA. This relationship was generally confirmed with data from the initial phase of the air deposition study. For example, PFDoA (12 carbons), perfluorotridecanoic acid (PFTriA; 13 carbons), and perfluorotetradecanoic acid (PFTA; 14 carbons) were only detected in the shallowest soils (i.e., zero detections in the 110 samples deeper than two inches below the ground surface).

In addition, perfluoroalkane sulfonic acids (PFSAs) tend to adsorb more strongly in soils than perfluoroalkyl carboxylic acids (PFCAs) with an equal number of carbons (Higgins and Luthy, 2007). Therefore, compared to PFOA (a PFCA), perfluorooctane sulfonate (PFOS; a PFSA) migrates more slowly

through soil columns. This relationship was also generally confirmed with data from the initial phase. For example, PFOS was detected at its highest concentrations and frequencies in the shallowest samples while PFOA was detected at its lowest concentrations in the shallowest samples.

PFAS transport in soils is typically conceptualized as involving equilibrium-controlled adsorption processes (e.g., Ahrens, et al., 2011; Anderson, et al., 2019; ITRC, 2022). Equilibrium-controlled adsorption is generally a reversible process (Zheng and Bennett, 2002). Unless the deposition, infiltration, percolation, and retention processes remained constant over an extended period of time, and similar to other water-soluble contaminants, the vertical distribution of solutes such as PFAS in soil is expected to change over time. For example, if deposition of the solute ceased, the solute adsorbed in the shallowest soil interval would then continue to desorb (go back into solution) and migrate further downward in the soil column in the percolating soil water as precipitation and infiltration continue. In other words, the solute concentrations would begin to decline in the shallowest interval relative to deeper intervals.

## 1.5 Summary of Initial Phase of Study

A thorough narrative on the study approach, methods, data summary, and data evaluation for the initial phase of the study is included within the final NYSDEC-approved Data Summary Report (C.T. Male/BEC, 2022). To assist in evaluation of the Supplemental Scope, the initial scope is briefly summarized in this section.

The objective of the initial phase was to determine whether the presence of PFAS was observable and consistent with an air deposition pattern in historically undisturbed soils surrounding the Village. The sampling design is summarized as follows:

- An area surrounding the Village was divided into 16 sectors on a radial grid (Figure 3).
- Discrete soil sampling was conducted at two to six sampling locations within each sector.
- Soil samples were collected from three intervals (0-0.17 feet below ground surface [bgs], 0.17-1 feet bgs, and 1-2 feet bgs) at each sampling location and analyzed for PFAS, TOC, and pH.
- A representative subset of 45 soil samples was selected for additional SPLP analysis.

The selection of sampling locations within each sector was guided by a desktop review of historical information such as aerial images and property records, a visual inspection of site conditions such as topography, and NYSDEC's input. The goal was to identify locations that met the criteria listed below:

- Undisturbed (not cultivated, farmed, filled, or manicured) for the past 60 years.
- No indication or evidence of dumping/nearby source.
- Outside of floodplain or wetland.
- Sufficient soil thickness available for sample (avoiding bedrock outcrops and areas of shallow bedrock).
- Clear land ownership and ability to obtain access from owner.

Access to properties and visual inspection of each sampling location was conducted with NYSDEC coordination and oversight. Ultimately, 171 soil samples (plus field duplicates) were collected from 57 individual sampling locations, as shown on Figure 3. A representative subset of 45 of these samples were selected, approved by NYSDEC, and submitted for SPLP extraction followed by PFAS analysis. Upon

sampling, two locations were determined to not meet the criteria of being undisturbed (i.e., evidence of fill upon sampling). At NYSDEC's direction, samples were collected and submitted for analysis, but are considered potentially not representative. Therefore, results from these locations were excluded from selected evaluations (e.g., summary statistics) and the number evaluated from the initial phase was 165 samples from 55 locations.

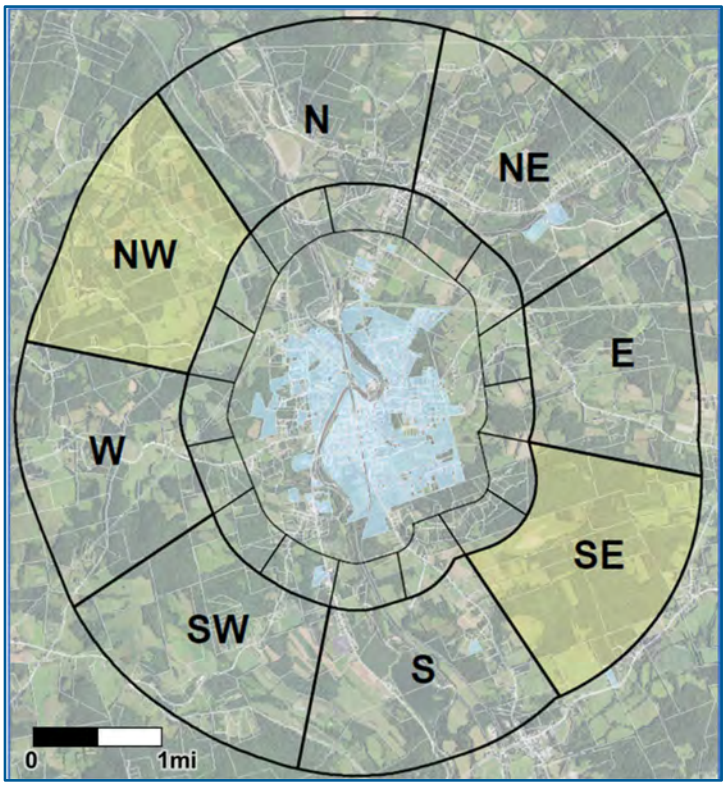
Data from the initial and supplemental phases are evaluated as one dataset within this report; however, for reference, the following tables containing only information from the initial phase have been included in Appendix B as follows:

- Table B1: Initial Phase Sample Location Summary
- Table B2: Soil Sample Descriptions (Initial Phase)
- Table B3: Initial Phase Analytical Results
- Table B4: Initial Phase Summary Statistics

The results from the initial phase of the study indicated that PFAS in shallow soils within the study area were observable and that air emission sources within the Village had potentially contributed to PFAS detections in the study area. For example, PFOA concentrations were generally higher in the downwind (i.e., southeast) direction. Additionally, the PFOA distribution within the soil column (i.e., higher concentrations in deeper samples) indicated historical rather than recent deposition (see Section 1.4).

# 2 Supplemental Phase Approach and Sampling Methods

As stated above, the objective for the supplemental phase of the study was to further define the nature and extent of PFAS in shallow soils in the Region resulting from air deposition. The soil sampling in the first phase of the study was completed at locations roughly 1,000 to 3,000 feet beyond the Village, surrounding the Village divided into 16 sectors on a radial grid (Graphic 2 and Figure 3). As detailed in the Supplemental Scope work plan (C.T. Male/BEC, 2021), the area for supplemental sampling was extended an additional 7,000 feet (i.e., approximately 3,000 to 10,000 feet or roughly 900 to 3,050 meters from the Village boundary), with sample locations as far as 3 miles (or 4,700 meters) from the approximate centroid of the Village. The supplemental sampling area was divided into eight sectors (roughly correlating to the four cardinal and four intercardinal directions), as shown on Graphic 2. The target number of sample locations in the predominant downwind (southeast) and predominant upwind (northwest) sectors was 10 to 15. The target number of sample locations in the remaining six sectors was 4 to 6.




**Graphic 2**: Supplemental Sampling Sectors

The purpose for soil sampling in all directions from the Village was to provide data to further define nature and extent of PFAS in soil in the Region resulting from air emissions and deposition. Data from the supplemental sampling are evaluated with data from the initial phase of this study. As stated in the Supplemental Scope, the larger number of samples in the northwest sector provides a more robust dataset which could serve as a proxy for regional background given the location 3,000 to 10,000 feet from the Village in the predominant upwind direction. The larger number of samples in the southeast sector provides a more robust dataset for comparison with other directions and to possibly evaluate the PFAS concentration gradients with distance.

Sample location vetting and coordination with NYSDEC for the Supplemental Scope were the same as for the initial phase of the study and described in detail in the initial data summary report (C.T. Male/BEC, 2022). Soil samples were collected in the same manner, from the same intervals and submitted to the laboratory for the same analysis as the initial phase. When sampling locations were selected, they were flagged and surveyed using a handheld global positioning system (GPS) unit prior to sampling.

Information regarding topography, tree cover, and other observations were noted during sampling (Table 1).

## 2.1 Sampling Methods

Sampling commenced in early November 2021 and was conducted in accordance with the Supplemental Scope (C.T. Male/BEC, 2021), Work Plan (C.T. Male, 2019), and Field Sampling Plan (C.T. Male/BEC, 2020a). Stainless-steel hand tools (hand hoe and two hand augers) were used to collect three soil samples, corresponding to three continuous depth intervals, at each sampling location. Each tool was utilized for a specific sampling interval within the bore hole, telescoping with depth to prevent sloughing and cross contamination. Tools used during sampling were decontaminated before and after use and wrapped in polyethylene sheeting until use at the next sampling location. A surface soil sample from 0-0.17 feet bgs (beginning below any vegetative cover), a near-surface soil sample from 0.17-1 feet bgs, and a subsurface soil sample starting from 1-foot bgs were successfully collected at each sampling location. The target interval for the subsurface soil sample was from 1-2 feet bgs; however, at several locations (E12, NW21, S02, SE10, SE13-A, SW02-A, and W01 in Table 1), a depth of 2 feet was not reached, even after several attempts, due to refusal. Descriptions of each soil sample were made at the time of collection (Table 2). Each soil sample was homogenized independently prior to being submitted for laboratory analysis. All soil samples were submitted for laboratory analysis of NYSDEC's list of 21 PFAS, TOC, moisture, and pH in accordance with the Quality Assurance Project Plan (QAPP; C.T. Male/BEC, 2020b).

## 2.2 Investigation Summary

Based on the approved Supplemental Scope (C.T. Male/BEC, 2021), the target number of sample locations ranged from 32 to 66 total unique sampling locations. Upon completion, a total of 156 samples and seven duplicates were collected from 52 unique sampling locations as part of the supplemental phase of the study. At least four sampling locations were sampled in each sector (Figures 3A and 3B). The combined dataset from the initial and supplemental phases of the study includes 321 soil samples collected from 107 individual sampling locations.

# 3 Supplemental Scope Results

The sampling locations for the initial and supplemental phases of the study are shown on Figures 3A and 3B. A discussion of the supplemental results, alone and in comparison to the initial results, are presented in this section. The data evaluation within Section 4 utilizes the entire dataset (i.e., initial and supplemental sample results).

Analytical results for soil (reported on a dry weight basis) are included in Table 3, which presents PFAS results sorted by group (i.e., sulfonic acids, carboxylic acids, and sulfonamide acetic acids) and in increasing carbon chain length order. PFAS that were not detected in any soil samples from the Supplemental Scope are not shown in Table 3.

The results of validation of the laboratory analytical data are summarized in the Data Usability Summary Reports (DUSRs) and will be provided to NYSDEC under a separate cover. The data validation was performed in accordance with the QAPP (C.T. Male/BEC, 2020b), NYSDEC requirements, and the requirements for development of DUSRs in Appendix 2B of DER-10, Technical Guidance for Site Investigations and Remediation. Analytical data were determined to be valid and usable as qualified for the purposes of the study with 10 exceptions. Of 40,500 analyses performed, 10 analyses were rejected resulting in a completeness of 99.8%. Seven of the rejected results were for N-methyl perfluorooctanesulfonamidoacetic acid (N-MeFOSAA; Table 3), and three of the rejected results were for N-ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA).

## 3.1 General Summary and Discussion

Table 4 includes PFAS summary statistics (number of samples, number of detections, minimum, maximum, arithmetic mean, geometric mean, median, and quartiles) for the 156 soil samples from the Supplemental Scope. Note that arithmetic mean, geometric mean, median, 25$^{th}$ percentile, and 75th percentile are presented in Table 4 when detection frequencies were greater than or equal to 50% and the total number of detections was at least five. Duplicates were excluded from summary statistics and evaluations. As shown in Table 4, 14 of the 21 PFAS were detected in at least one soil sample. The following seven PFAS were not detected in any soil samples from the Supplemental Scope:

- Perfluorobutanesulfonic acid (PFBS)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluoroheptanesulfonic acid (PFHpS)
- Perfluorodecanesulfonic acid (PFDS)
- Perfluorooctanesulfonamide (PFOSA)
- 8:2 Fluorotelomer sulfonic acid (8:2 FTS)
- 6:2 Fluorotelomer sulfonic acid (6:2 FTS)

Of the 14 PFAS detected (Table 4), 11 were PFCAs, and the only non-PFCAs detected were PFOS, N-EtFOSAA, and N-MeFOSAA. The four most frequently detected PFAS, listed in order by decreasing detection frequency, were PFOA (94%), PFOS (60%), perfluoroheptanoic acid (PFHpA; 41%), and perfluorohexanoic acid (PFHxA; 19%). All other detected PFAS were detected in 13% or less of the soil samples (Table 4). PFOA was the predominant PFAS in samples from the Supplemental Scope because it was the most frequently detected and had the highest median and maximum concentrations. The

concentration of PFOA in each soil sample (i.e., samples from both the initial and supplemental phases) is shown on Figures 4A, 4B, and 4C and separated by sampling interval. Detected PFOA concentrations ranged from 0.3 to 13 parts per billion (ppb; equal to nanograms per gram), with the maximum concentration detected in the near-surface soil at locations NW24 and NW13 (Figure 4B).

PFOS was the next most prevalent PFAS, with detection frequency, maximum concentrations, and median concentration second to PFOA. The concentration of PFOS in each soil sample is shown on Figures 5A, 5B, and 5C. Detected PFOS concentrations ranged from 0.24 to 12 ppb, with the maximum concentration detected in surface soil at location NW24 (Figure 5A).

The concentrations in soil samples for nine additional PFAS are shown on figures as indicated below:

- Perfluorobutanoic acid (PFBA) - Figures 6A, 6B, and 6C
- PFPeA - Figures 7A, 7B, and 7C
- PFHxA - Figures 8A, 8B, and 8C
- PFHpA - Figures 9A, 9B, and 9C
- Perfluorononanoic acid (PFNA) - Figures 10A, 10B, and 10C
- Perfluorodecanoic acid (PFDA) - Figures 11A and 11B
- Perfluoroundecanoic acid (PFUnA) - Figures 12A and 12B
- Perfluoroundecanoic acid (PFDoA) - Figure 13
- Perfluoroundecanoic acid (PFTriA) – Figure 14

There are no Soil Cleanup Objectives for PFAS in New York regulations; however, New York State Department of Health (DOH) guidance values (NYSDEC, 2021b) have been prepared for PFOA and PFOS and are included in NYSDEC's PFAS guidance (NYSDEC, 2021a). Table 3 denotes whether the sample results for PFOA and PFOS exceed the various DOH guidance values.

PFOA concentrations were below the Residential guidance value (6.6. ppb) in 89% of the samples. Importantly, there were no exceedances of Residential guidance values in surface soils (0-2 inches bgs), which is the preferred interval to determine potential exposure for residents (NYSDEC, 2021b). Additionally, none of the 156 samples exhibited PFOA concentrations in exceedance of the Restricted Residential guidance value (33 ppb).

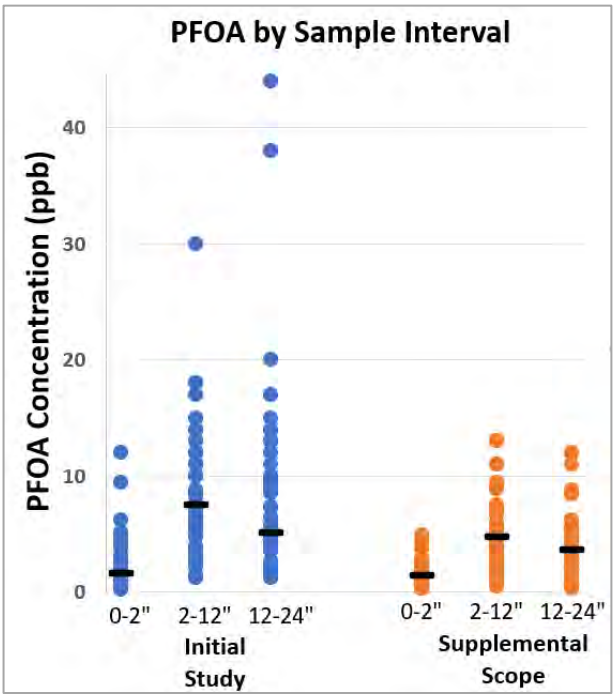
PFOS concentrations were below the Residential guidance value in all samples, except for the surface soil sample collected at NW24 (one of the furthest predominant upwind sample locations; Figure 5A).

Analytical results for TOC, moisture, and pH are also included in Table 3, and the summary statistics are included in Table 4.

## 3.2 Comparison with Initial Results

As detailed above, the sampling for the Supplemental Scope was designed to replicate that of the initial scope except for distance. (i.e., Supplemental Scope samples were collected further from the Village). In general, the data from the initial phase and the supplemental phase were comparable based on the following (see Table 4 and Table B4):

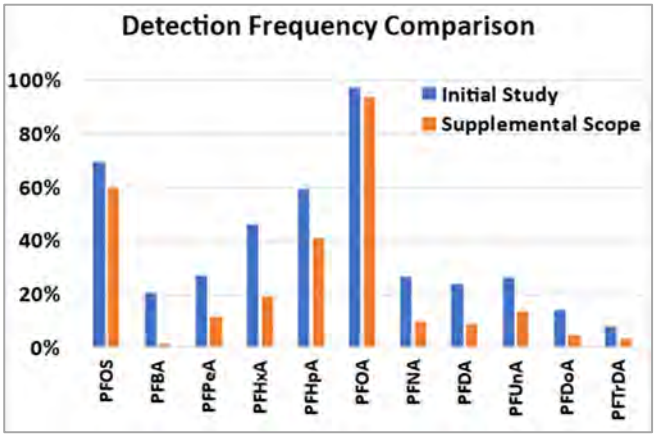
- PFOA was the predominant PFAS (i.e., highest detection frequency and highest concentrations), and PFOS was the second most prevalent in aggregate for both phases of investigation.
- PFOA, PFOS, PFHpA, and PFHxA were the four most frequently detected PFAS for both phases of investigation.
- Relative PFOA distribution with depth interval was generally consistent for both phases (i.e., lowest concentrations in surface soil samples (Graphic 3).
- Distribution across depth interval for other PFAS was also consistent for both phases, demonstrating a pattern as would be generally predicted by their chain length (i.e., PFAS with longer chain lengths migrate more slowly and remain shallow).




**Graphic 3:** PFOA Distribution; median shown in black

PFAS deposited from an air emission source within the Village would demonstrate decreasing concentrations with distance in all directions. The following differences from the initial and supplemental phases of the study tend to confirm that PFAS concentrations decrease with distance from the center of the Village:

- Detection frequencies were lower for all detected PFCAs and PFSAs in the supplemental results (Graphic 4).
- The maximum, median, and mean concentrations for PFOA were lower in the supplemental results (Graphic 3, Table 4 and Table B4).
- The concentrations for other PFAS were also generally lower in the supplemental results with exceptions for certain PFAS in the areas as noted below.




**Graphic 4:** Detection Frequencies

The following differences between the initial and supplemental results are inconsistent with decreasing concentrations with distance:

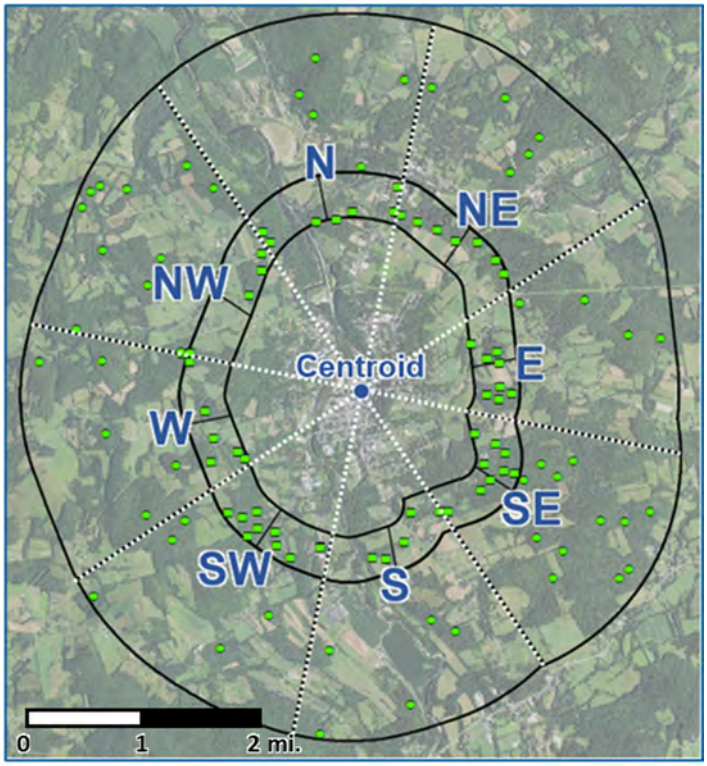
- The maximum detected PFOS concentrations from the supplemental results were approximately five times higher than the maximum from the initial results and found at sampling locations at the greatest distance from the Village.
- The maximum detected concentrations for PFPeA and PFNA in the supplemental results were also higher (approximately 3 and 1.5 times greater, respectively) than the initial results.

# 4 Data Evaluation

The evaluations within this section utilize the entire dataset (i.e., Initial Study plus Supplemental Scope) which includes 321 discrete soil samples from 107 unique sample locations in all directions from the Village (Figures 3A and 3B). The objective for the Initial Study was to determine whether PFAS in shallow soils were observable and consistent with an air deposition pattern. The objective for the Supplemental Scope was to provide additional data at increased distances from the Village to further evaluate the nature and extent of PFAS in shallow soils around the Village. The larger number of Supplemental Scope samples in the northwest (i.e., upwind) and southeast (i.e., downwind) was designed to provide a more robust dataset for evaluation of concentrations with distance as they would be anticipated to be the least impacted and most impacted, respectively, from air emissions sources within the Village.

## 4.1 Evaluation by Distance and Direction

As described in Section 2, sampling sectors were arranged radially to provide data distributed in all directions from the Village. The Initial Study area was divided into 16 sectors and the Supplemental Scope area was divided into eight sectors. For the evaluations discussed herein, the data from both phases are combined into eight groups based on direction (Graphic 5). Additionally, the evaluations by distances are based on a distance as measured from the approximate centroid of the Village (Graphic 5).




**Graphic 5**: Direction Groupings and Centroid

Plots of PFAS concentration for each sampling interval versus distance are included as Appendix C for the 11 most frequently detected PFAS (in the same order as Figures 4 through 14). The direction groupings are distinguished by color, as shown in the key for each plot. Where sufficient detections allow, the plots also include a trendline for PFAS concentrations in the predominant downwind direction (i.e., southeast). Note that plots for sampling intervals without detections are not included in Appendix C.

The following observations, based on review of the plots in Appendix C and Figures 4 through 14, are consistent with the anticipated regional pattern resulting from PFAS air emissions sources within the Village (Section 1.3):

- Concentrations of PFOA in the predominant downwind direction (i.e., southeast) demonstrate a decreasing trend with distance in all three sampling intervals (page 1 of Appendix C). This trend is also demonstrated for PFHxA and PFHpA (pages 5 and 6 of Appendix C, respectively); and

- The overall detection frequencies and concentrations for several PFAS are clearly higher at closer distances. Examples include PFBA, PFPeA, PFNA, PFDA, PFUnA and PFDoA (pages 3, 4, and 7-11 of Appendix C).

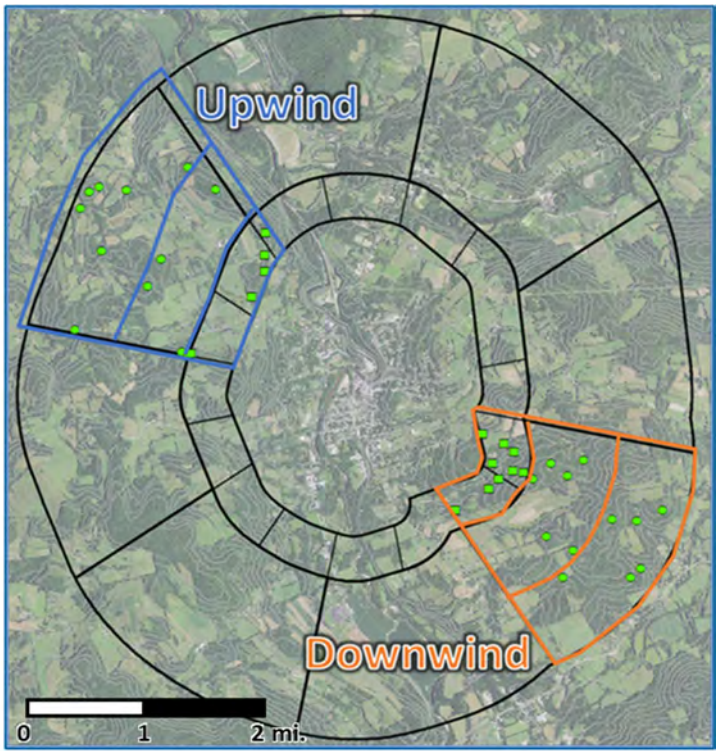
The following observations, based on review of the plots in Appendix C and Figures 4 through 14, are not consistent with the anticipated regional pattern resulting from PFAS air emissions sources within the Village (Section 1.3):

- The maximum PFOA concentrations are not in the predominant downwind direction (page 1 of Appendix C). The maximum PFOA concentrations within 3,000 meters (approximately 1.85 miles) of the approximate Village centroid for the surface, near surface, and subsurface interval samples are in the south, northeast, and east sectors, respectively. The maximum PFOA concentrations beyond 3,000 meters of the approximate Village centroid for the surface, near surface, and subsurface samples are in the northeast, and northwest sectors, respectively.
- Concentrations of PFOS in the predominant downwind direction (i.e., southeast) do not demonstrate a decreasing trend with distance (page 2 of Appendix C).
- Between 2,250 meters and 2,500 meters (approximately 1.5 miles) in the northeast sector relatively high concentrations of several PFAS are detected, including PFBA (Figures 6B and 6C); PFHxA (Figure 8B); PFHpA (Figure 9B); PFNA (Figures 10A and 10B); PFDA (Figures 11A and 11B); PFUnA (Figure 12A); and PFDoA (Figure 13A).
- PFBA is detected more frequently and at higher concentrations in the west and southwest (page 3 of Appendix C and Figures 6A-6C); and
- The highest PFOA and PFOS concentrations in the outer 1,000 meters of the sampling area are all located in the northwest (i.e., the predominant upwind direction).

In summary, the distributions of some PFAS in some directions are consistent with a regional pattern that would be expected from air emissions sources within the Village. However, the distributions of certain PFAS in other directions are not consistent with a regional pattern that would be associated with air emission sources within the Village (i.e., soil concentrations decreasing with distance).

## 4.2 Comparison of Upwind and Downwind PFAS Data

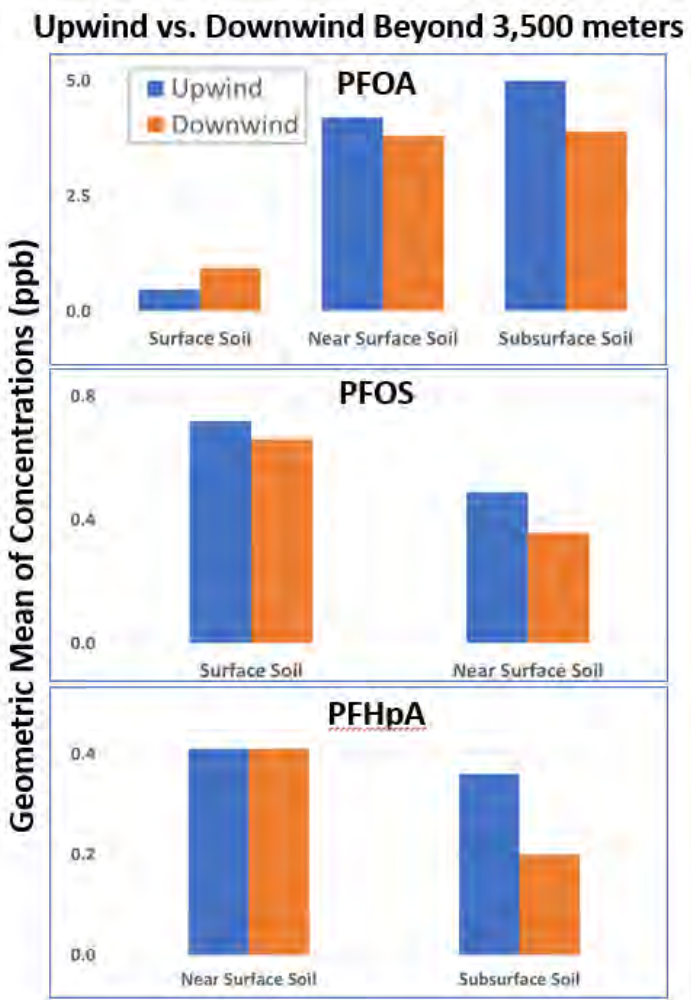
A comparison of upwind and downwind soil concentrations has been used in other air deposition investigations. Specifically, with PFAS, the presence of an upwind/downwind concentration gradient (i.e., higher concentration downwind) was used to evaluate potential PFAS air emissions and deposition from incineration at the Norlite facility in Cohoes, New York (NYSDEC, 2021b). The increased number of sampling locations in the predominant upwind (i.e., northwest) and predominant downwind (i.e., southeast) directions allows for this comparison for this study. As shown on Graphic 6, the upwind dataset includes 17 sampling locations, and the downwind dataset includes 21 sampling locations. Table D1 in Appendix D provides a side-by-side comparison of the summary statistics for these upwind and downwind datasets.




**Graphic 6**: Upwind and Downwind Datasets (shown in green)

Most PFAS for most intervals have higher maximum concentrations and geometric means in the downwind direction. This is consistent with the expected regional pattern. Notable exceptions to the expected regional pattern include PFBA (which is detected in upwind samples but not in any downwind samples) and several PFAS in subsurface soils with higher detection frequencies and maximum detected concentrations in the upwind dataset (Table D1).

Given the trend in concentrations with distance (see Section 4.1), the upwind and downwind datasets have been divided into three approximately even groups based on distance from the approximate Village centroid (Graphic 6). This allows for an upwind versus downwind comparison for three different distance-based groups. Consistent with similar NYSDEC evaluations (NYSDEC, 2021b), the statistic of focus for these comparisons is the geometric mean (Table D2). As noted in Table D2, the three distance-based groups are divided as follows: the inner groups include all samples out to approximately 2,540 meters from the approximate Village centroid (correlating with the initial study area); the middle groups include samples from 2,540 to 3,500 meters; and the outer groups include samples beyond 3,500 meters. Note that each group contains at least five sampling locations, and geometric means are only presented for groups with at least a 50% detection frequency.




**Graphic 7**: Upwind and Downwind Datasets

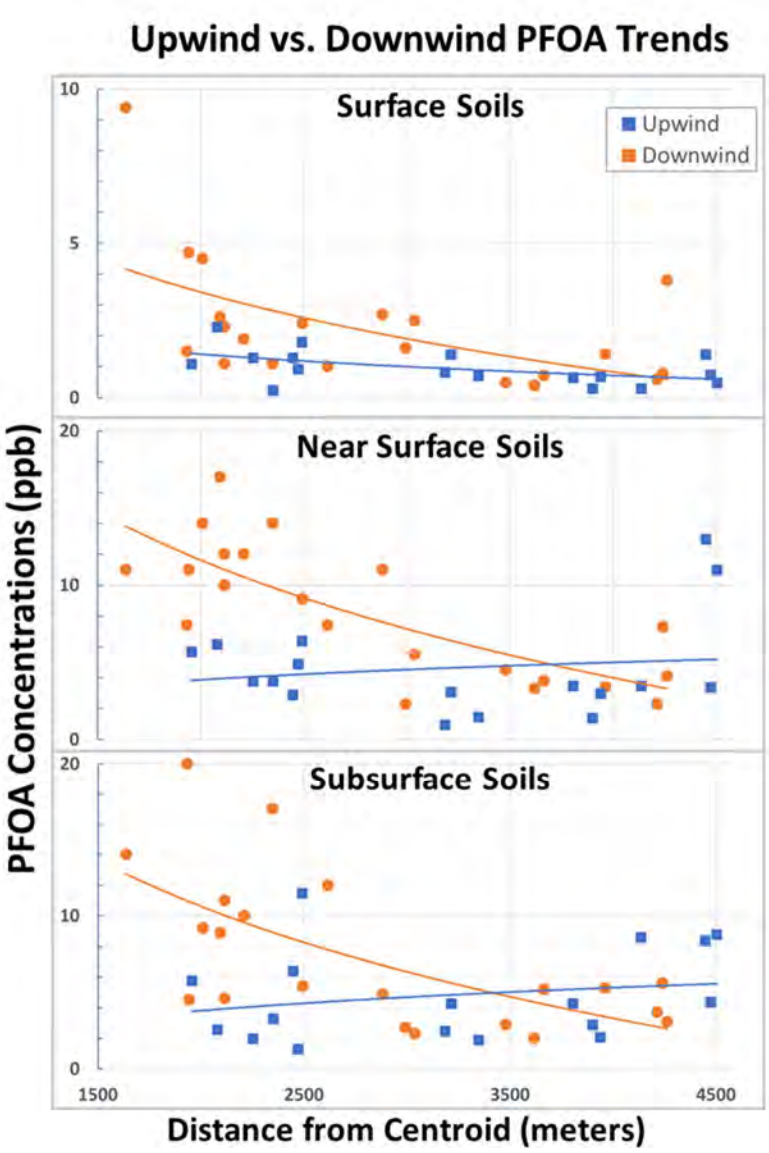
The comparison of geometric means for PFOA, PFOS, and PFHpA (the only three PFAS with sufficient detections for comparisons at multiple distances) are shown graphically on Figures D1 through D3 of Appendix D. As shown on these figures, the mean concentrations for PFOS, PFOA, and PFHpA in all three sampling intervals are higher in the downwind direction for both the inner (less than 2,540 meters) and middle (2,540 to 3,500 meters) distances. Therefore, relative concentrations of PFAS in the upwind and downwind directions out to 3,500 meters are generally consistent with the anticipated regional pattern from air emissions from within the Village (i.e., higher soil concentrations in the predominant downwind direction and decreasing concentration with distance).

However, for the outer distance (i.e., beyond 3,500 meters), the comparison reverses and the upwind concentrations are either higher or similar (Graphic 7). Therefore, beyond 3,500 meters, there is no observable upwind/downwind concentration gradient that is consistent with air deposition from sources within the Village.

The comparison of upwind and downwind PFOA concentrations can also be visualized by placing the trends for each direction on the same graph, as shown on Graphic 8 (note that trend lines represent a

logarithmic line of best fit for each direction and sampling interval). These trends confirm the comparison of geometric means presented above by showing the trends in PFOA concentrations intersecting (i.e., become equivalent) within the outer third of the sampling area. It is also notable that the concentration of PFOA in the upwind direction for both near-surface and subsurface soils demonstrate an increasing trend with distance from the Village.

There is evidence of an upwind and downwind gradient in PFAS concentrations within 3,500 meters from the approximate centroid of the Village but not beyond 3,500 meters (approximately 2.2 miles). The comparisons above utilize data in the predominant downwind direction, which is anticipated to be the most impacted by PFAS air emissions from sources within the Village (see Section 1.3). Therefore, associated PFAS impacts in other directions are anticipated to be lesser. Furthermore, the increasing upwind PFAS concentrations beyond 3,500 meters were found at multiple sample locations, separated by more than 500 meters (0.3 miles) and, therefore, unlikely to be the result of a source other than air emissions. Increasing concentrations of PFAS with distance upwind from the Village are not consistent with or explainable by air emissions and deposition from a source within the Village.




**Graphic 8**: Upwind vs. Downwind PFOA Trends

# 5 Summary

The soil data set for this study includes results for 321 discrete soil samples collected from 107 locations with three depth intervals at each location. All sample locations were carefully vetted in coordination with NYSDEC to be representative of potential air deposition and to avoid other known or suspected sources/transport pathways. In addition to soil sampling, a weather station was installed at the McCaffrey Street facility in November 2018 and has generated data since that time in support of this study. Below is a summary of the results and evaluations included in this report.

- Results from this study indicate that the presence of PFAS in shallow soils within 3,500 meters (approximately 2.2 miles) of the center of the Village is generally consistent with an air deposition pattern within the predominant wind direction from sources within the Village. However, beyond this distance, the upwind concentrations of PFAS are higher than or comparable to downwind concentrations; this distribution cannot be explained by an air emissions source within the Village.

- The distribution of various PFAS and their concentrations within the study area indicate that there are multiple air emissions sources of PFAS within the Village and/or the Region. For example, the locations of maximum concentrations and higher frequencies of detections for several PFAS are not consistent with each other (e.g., locations of PFBA and PFDA concentrations do not correlate with PFOA) or the anticipated regional pattern if there were a single air emissions source in the region.

- The increasing concentrations of PFAS with upwind distance from the Village indicates an upwind source(s) as increased concentrations with distance are not explainable by transport from a source within the Village. These upwind PFAS concentrations were observed at several sampling locations, separated by more than 500 meters (0.3 miles) and, therefore, unlikely to be the result of a source other than air emissions.

Additional investigation is currently being planned in coordination with NYSDEC and will be included in the forthcoming OU-03 Remedial Investigation Work Plan.

# 6 References


Ahrens, L., Yeung, L.W., Taniyasu, S., Lam, P.K. and Yamashita, N., 2011. Partitioning of perfluorooctanoate (PFOA), perfluorooctane sulfonate (PFOS) and perfluorooctane sulfonamide (PFOSA) between water and sediment. Chemosphere, 85(5), pp.731-737.

Anderson, R.H., Adamson, D.T. and Stroo, H.F., 2019. Partitioning of poly-and perfluoroalkyl substances from soil to groundwater within aqueous film-forming foam source zones. Journal of contaminant hydrology, 220, pp.59-65.

C.T. Male, 2019. Final Regional Air Deposition Study Work Plan for the Village of Hoosick Falls, Rensselaer County, New York. August 23, 2019.

C.T. Male/BEC, 2020a. Field Sampling Plan. 14 McCaffrey Street (Site No. 442046) and 1 Liberty Street (Site No. 442048) Village of Hoosick Falls. March 2020.

C.T. Male/BEC, 2020b. Quality Assurance Project Plan. 14 McCaffrey Street (Site No. 442046) and 1 Liberty Street (Site No. 442048) Village of Hoosick Falls. 06 March 2020.

C.T. Male/BEC, 2021. Supplemental Scope of Work: Regional Air Deposition Study. Village of Hoosick Falls. August, 2021.

C.T. Male/BEC, 2022. Data Summary Report: Regional Air Deposition Study. Village of Hoosick Falls. July, 2022.

Higgins, C.P., and R.G. Luthy, 2007. "Modeling Sorption of Anionic Surfactants onto Sediment Materials: An a priori Approach for Perfluoroalkyl Surfactants and Linear Alkylbenzene Sulfonates." Environmental Science & Technology 41 (9):3254-3261. doi: 10.1021/es062449j.

ITRC . 2022. PFAS Technical and Regulatory Guidance Document and Fact Sheets PFAS-1. Washington, D.C.: Interstate Technology & Regulatory Council, PFAS Team. Accessed July 20, 2022 https://pfas-1.itrcweb.org/.

Lafleur, R.G. and B.S. Ellis, 1988. Physiography and Geology, in Work, R., 1988. Soil Survey of Rensselaer County, New York. United States Department of Agriculture, Soil Conservation Service.

NYSDEC, 2010. DER-10/Technical Guidance for Site Investigation and Remediation. May 3, 2010NYSDEC, 2019a. Summer 2019 Community Update on PFAS Cleanup in the Hoosick Area. 26 June 2019.

NYSDEC, 2021a. Guidelines for Sampling and Analysis of PFAS Under NYSDEC's Part 375 Remedial Programs. June 2021.

NYSDEC, 2021b. Norlite Environmental Sampling Report. March 2021.

NYSDEC, 2021c. Per- and Polyfluoroalkyl Substances (PFAS). New York State Department of Environmental Conservation https://www.dec.ny.gov/chemical/108831.html. Accessed June 30, 2021.

NYSDEC, 2021e. Record of Decision, Saint-Gobain McCaffrey Street Site. Operable Unit Number 02: Municipal Water Supply. Site No. 442046. New York State Department of Environmental Conservation. December 2021

Rensselaer County Economic Development & Planning, 2015. Town of Hoosick, New York Land Use District Map. Downloaded from http://www.townofhoosick.org/zoningboard.shtml on September 4, 2019.

United States Department of Agriculture and Natural Resources Conservation Service (USDA and NRCS), 2011. New York Rapid Watershed Assessment Profile. Hudson-Hoosic Watershed HUC: 02020003. 30 p.

Zareitalabad, P., Siemens, J., Hamer M., and Amelung, W., 2013. Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS) in surface waters, sediments, soils and wastewater - a review on concentrations and distribution coefficients. Chemosphere. 91(6):725-732. doi: 10.1016/j.chemosphere.2013.02.024

Zheng, C. and G.D. Bennett, 2002. Applied Contaminant Transport Modeling, Second Edition. Wiley-Interscience, New York, NY. 621p.

# Figures

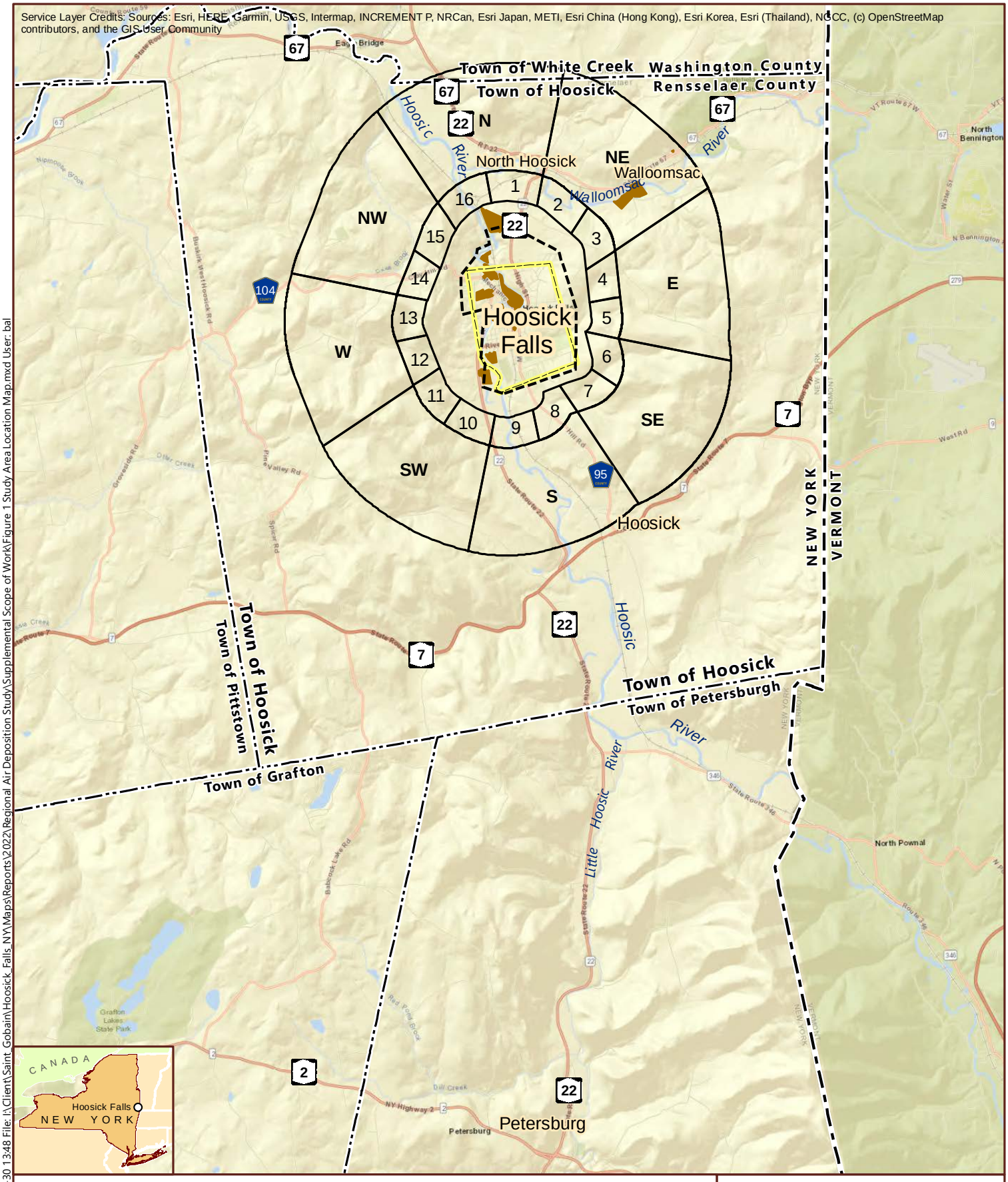
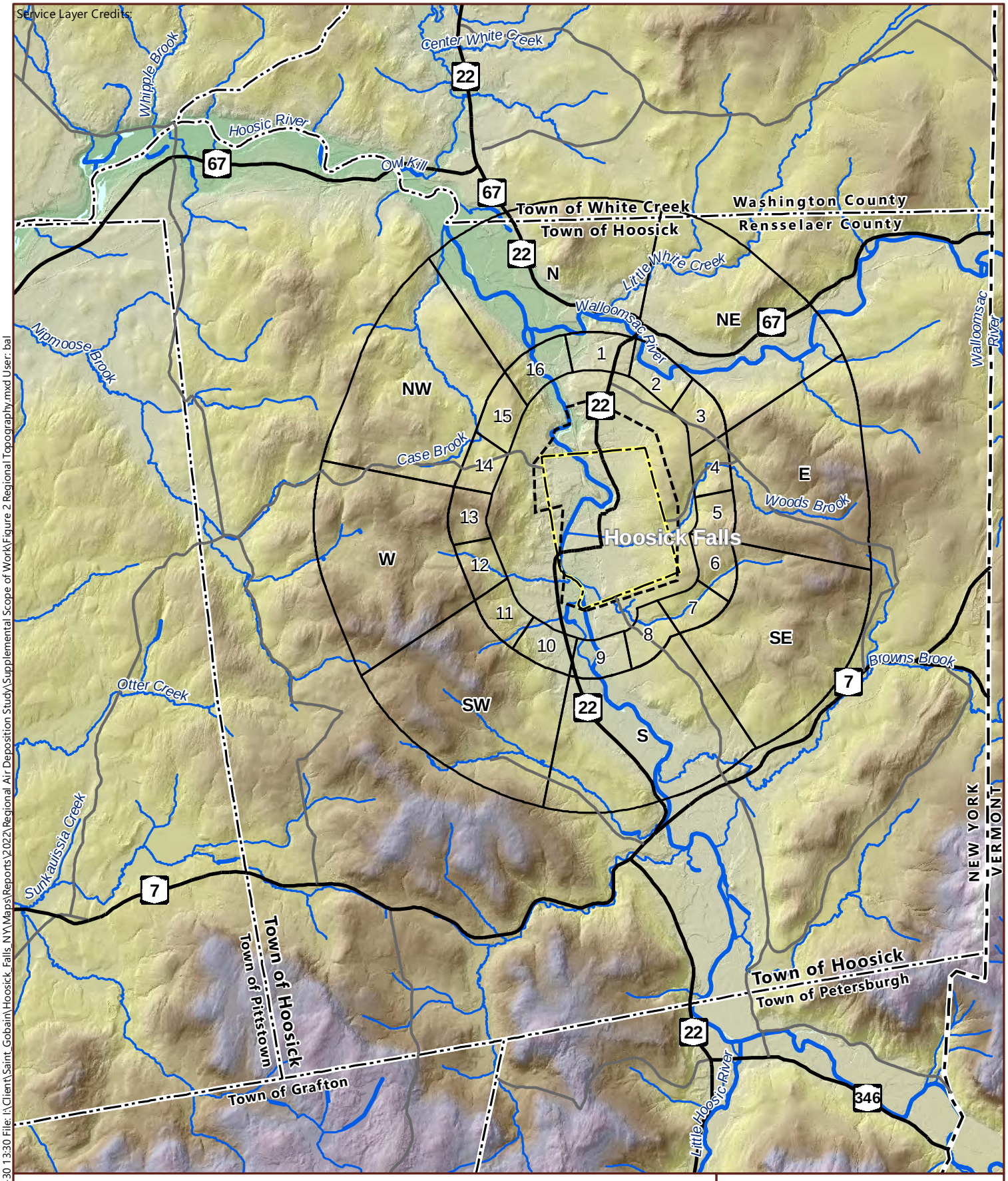



FIGURE 1

**STUDY AREA LOCATION MAP**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:48 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 1 Study Area Location Map.mxd User: bal




Soil Sampling Sector Boundary
Current OU-01 Boundary
Hoosick Falls Village Limits
Town Boundary

Elevations shown are in feet above mean sea level

N

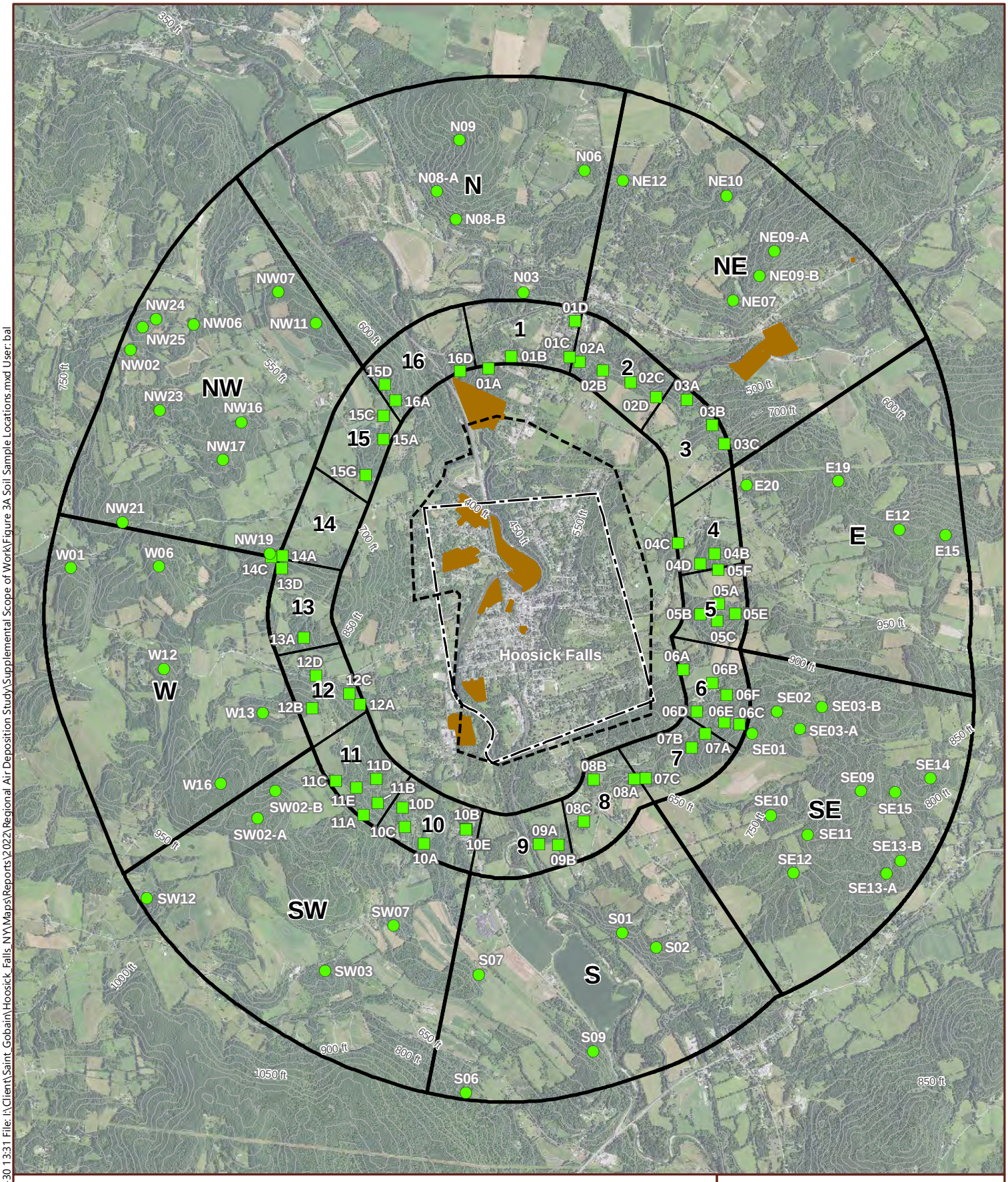
0 4,000 8,000 12,000

Feet

FIGURE 2

**REGIONAL TOPOGRAPHY**
Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:30 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 2 Regional Topography.mxd User: bal




First Scope Locations

Supplemental Scope Locations

Soil Sampling Sector Boundary

Current OU-01 Boundary

Sites of Interest

Hoosick Falls Village Limits

N

0 2,000 4,000 6,000

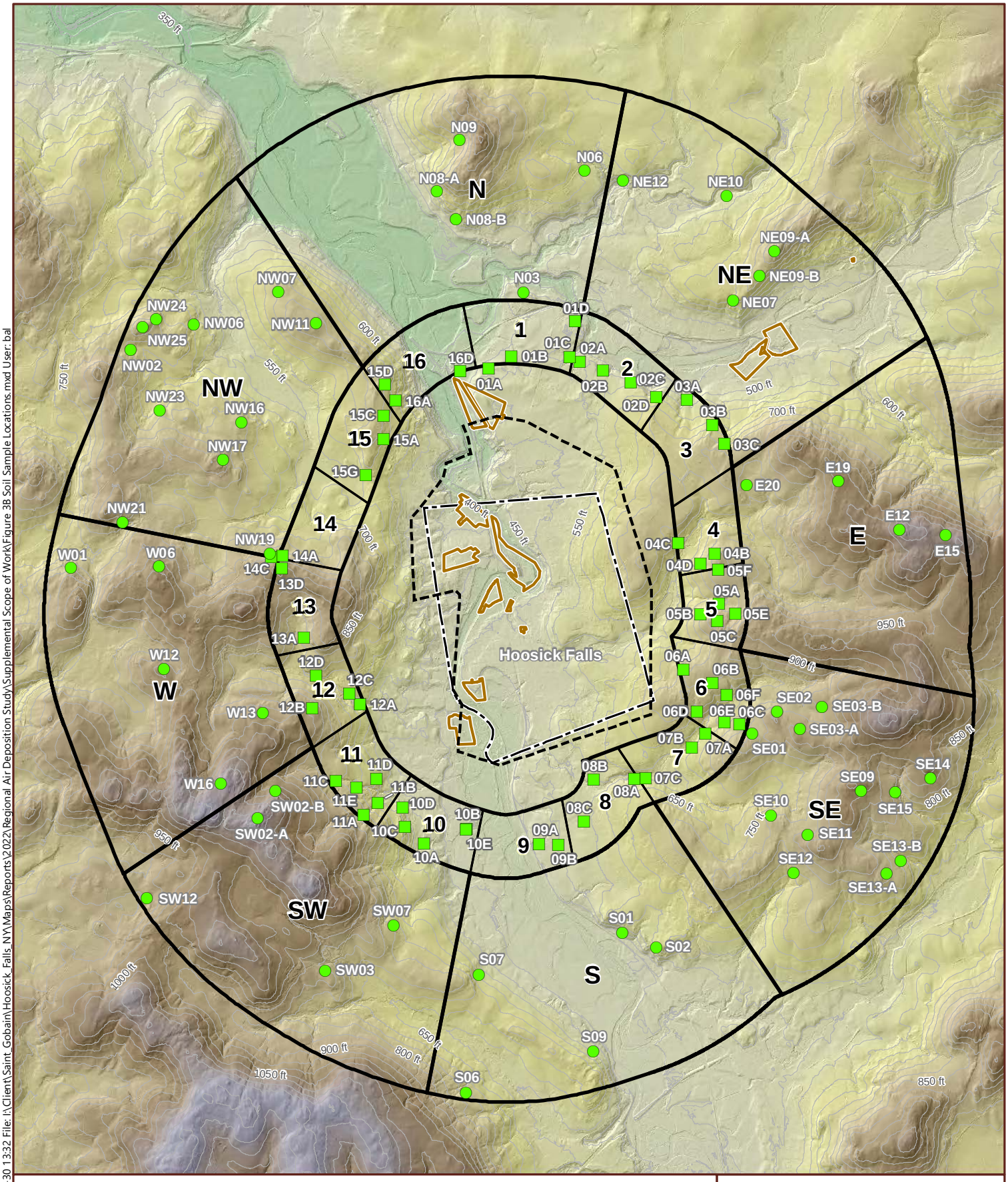
Feet

FIGURE 3A

**SOIL SAMPLE LOCATIONS**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:31 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 3A Soil Sample Locations.mxd User: bal




Supplemental Scope Locations
First Scope Locations
Soil Sampling Sector Boundary
Current OU-01 Boundary
Sites of Interest
Hoosick Falls Village Limits

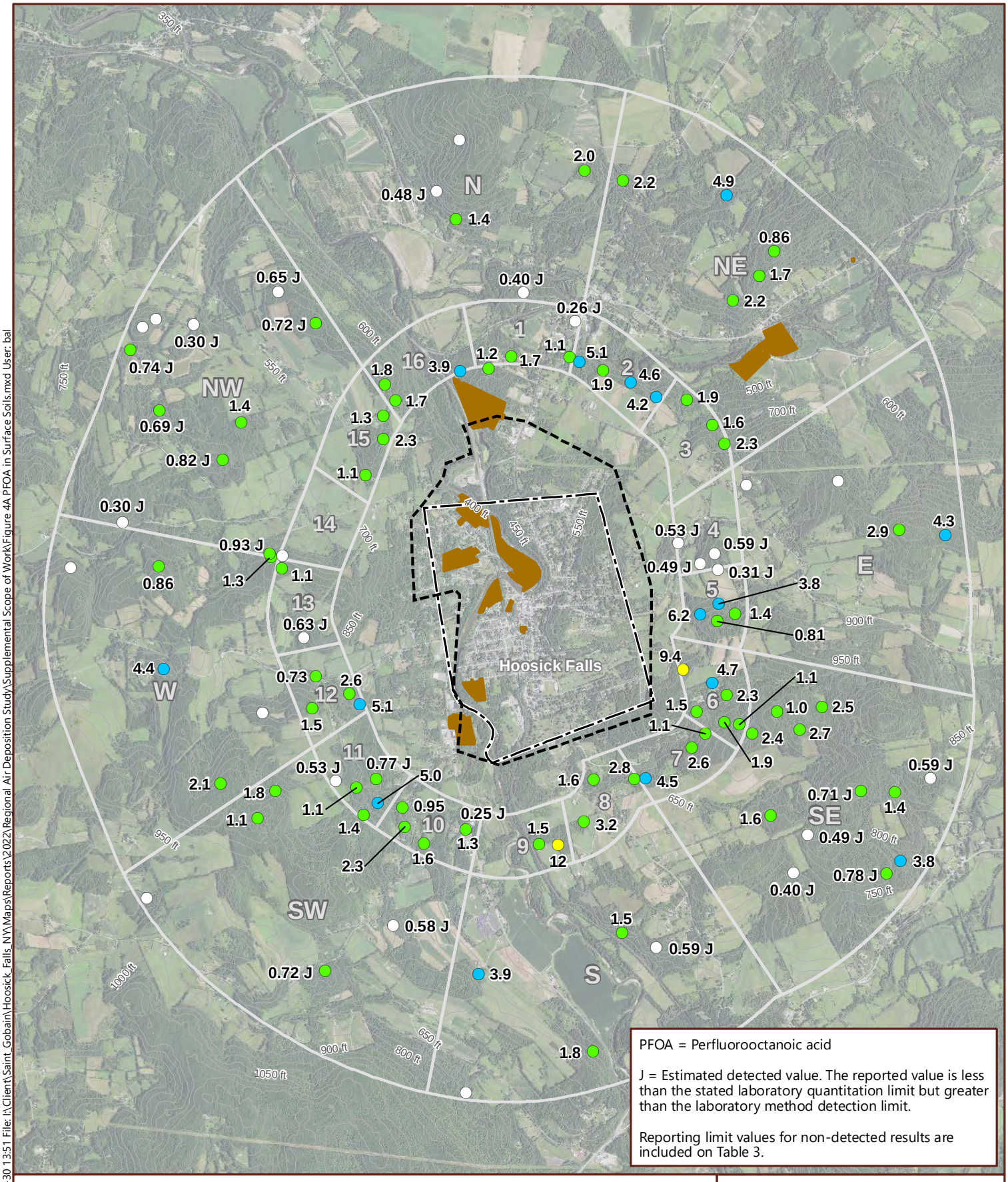
N

0 2,000 4,000 6,000
Feet

FIGURE 3B

**SOIL SAMPLE LOCATIONS**
Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:32 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 3B Soil Sample Locations.mxd User: bal




PFOA = Perfluorooctanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFOA Concentrations**

- 0 - 0.66
- >0.66 - 3.3
- >3.3 - 6.6
- >6.6 - 12

"0" = ND

ppb = parts per billion and nanograms per gram (ng/g).

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000

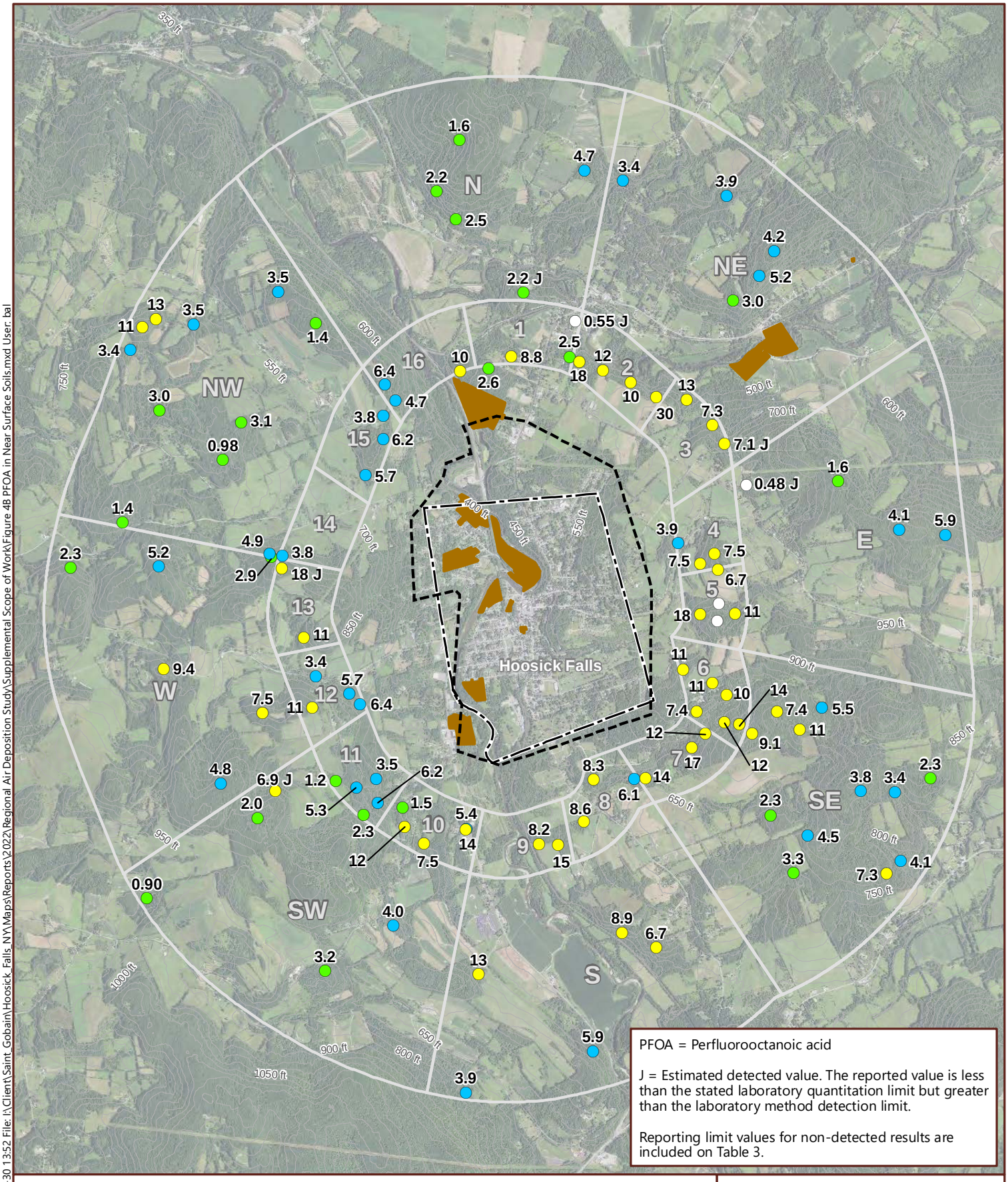
Feet

FIGURE 4A

**PFOA IN SURFACE SOILS**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:51 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 4A PFOA in Surface Soils.mxd User: bal




PFOA = Perfluorooctanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFOA Concentrations**

- 0 - 0.66
- >0.66 - 3.3
- >3.3 - 6.6
- >6.6 - 30

"0" = ND

ppb = parts per billion and nanograms per gram (ng/g).

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000

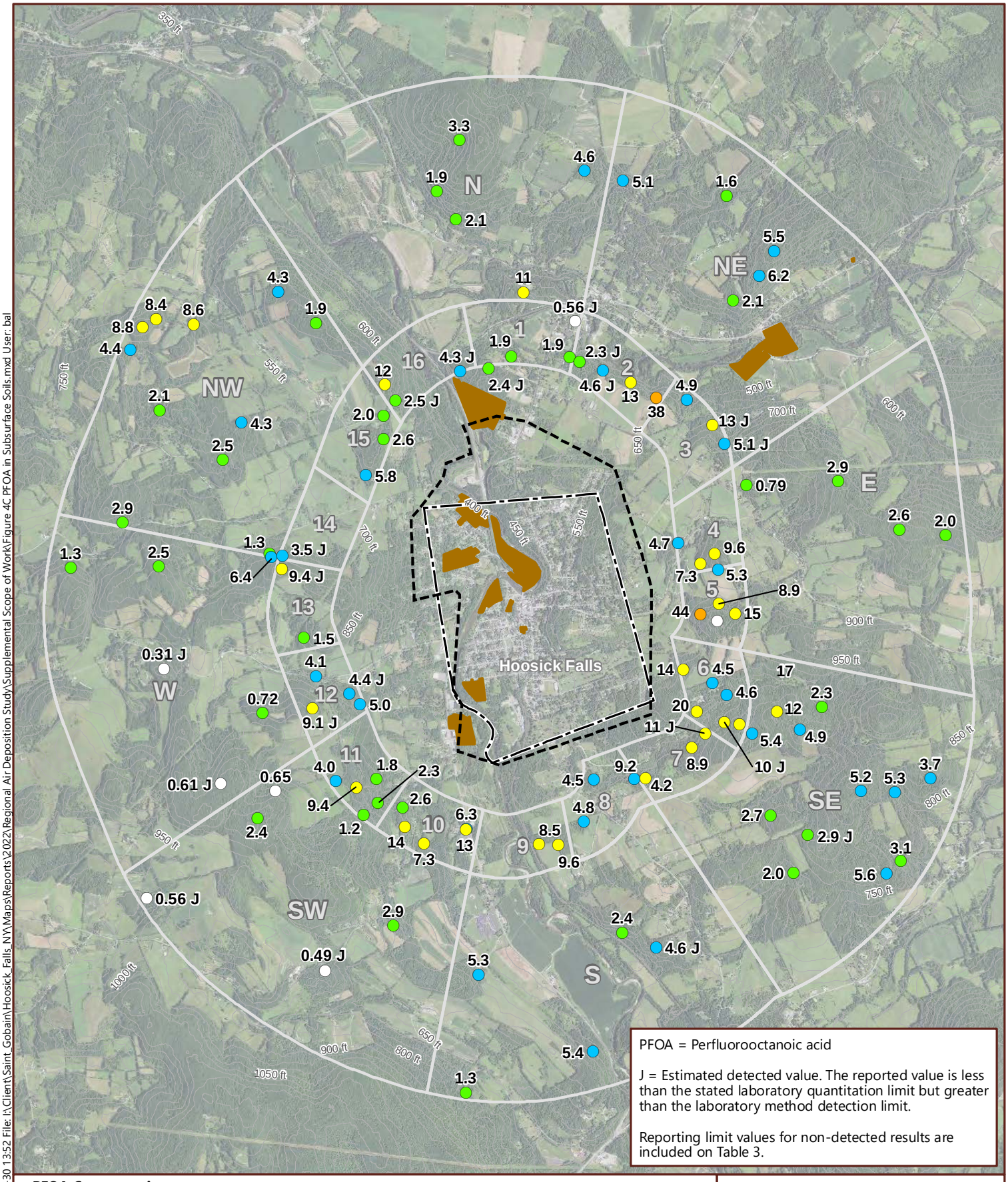
Feet

FIGURE 4B

**PFOA IN NEAR SURFACE SOILS**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:52 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 4B PFOA in Near Surface Soils.mxd User: bal




PFOA = Perfluorooctanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFOA Concentrations**

- 0 - 0.66
- >0.66 - 3.3
- >3.3 - 6.6
- >6.6 - 33
- >33 - 44

"0" = ND

ppb = parts per billion and nanograms per gram (ng/g).

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000

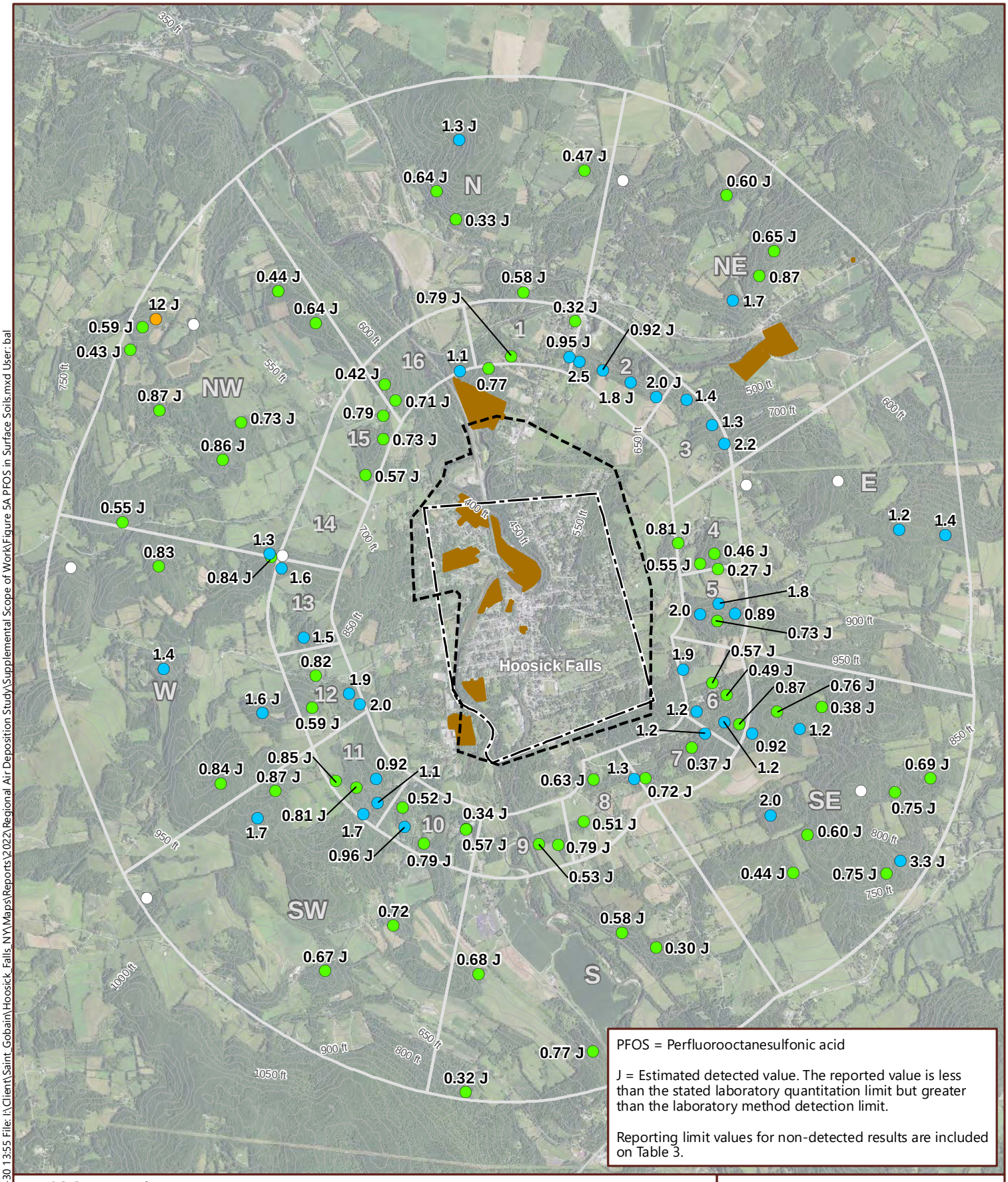
Feet

FIGURE 4C

**PFOA IN SUBSURFACE SOILS**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:52 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 4C PFOA in Subsurface Soils.mxd User: bal




PFOS = Perfluorooctanesulfonic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFOS Concentrations**

- ND
- 0 - 0.88
- > 0.88 - 4.4
- > 4.4 - 8.8
- > 8.8 - 12

ppb = parts per billion and nanograms per gram (ng/g).

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000

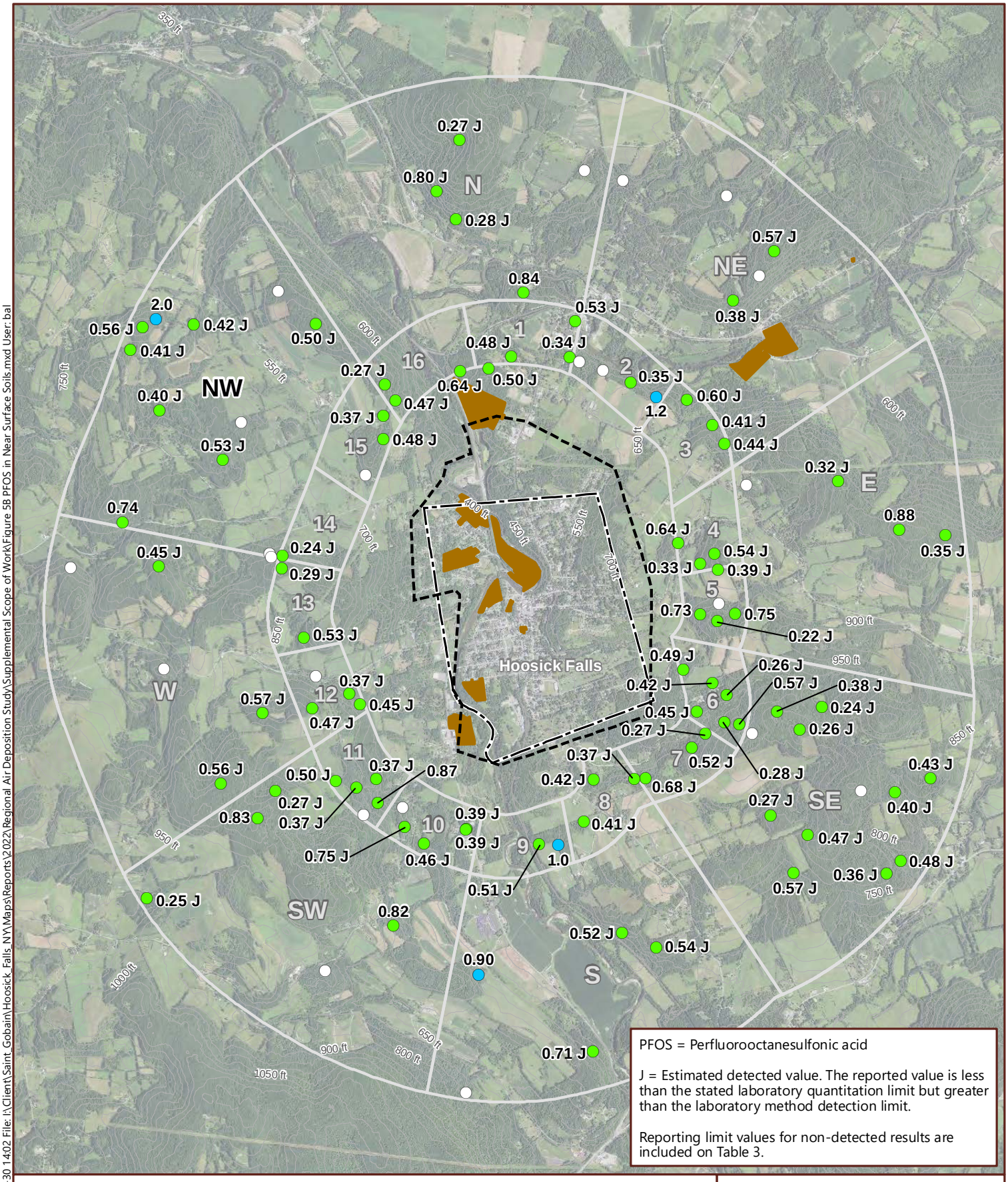
Feet

FIGURE 5A

**PFOS IN SURFACE SOILS**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 13:55 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 5A PFOS in Surface Soils.mxd User: bal




PFOS = Perfluorooctanesulfonic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFOS Concentrations**

- ND
- 0 - 0.88
- >0.88 - 3.3

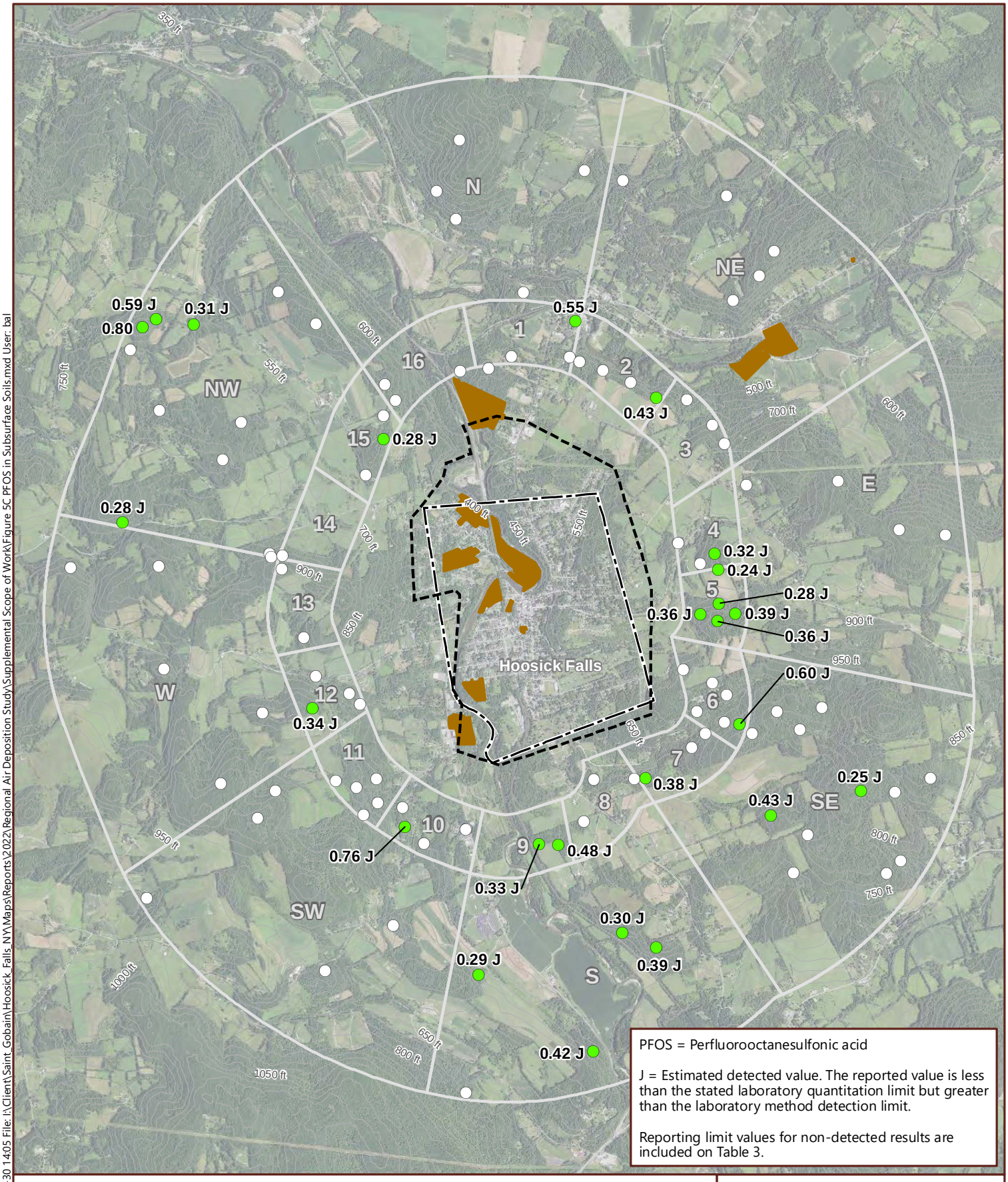
- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000
Feet

ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 5B

**PFOS IN NEAR SURFACE SOILS**
Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY




PFOS = Perfluorooctanesulfonic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFOS Concentrations**

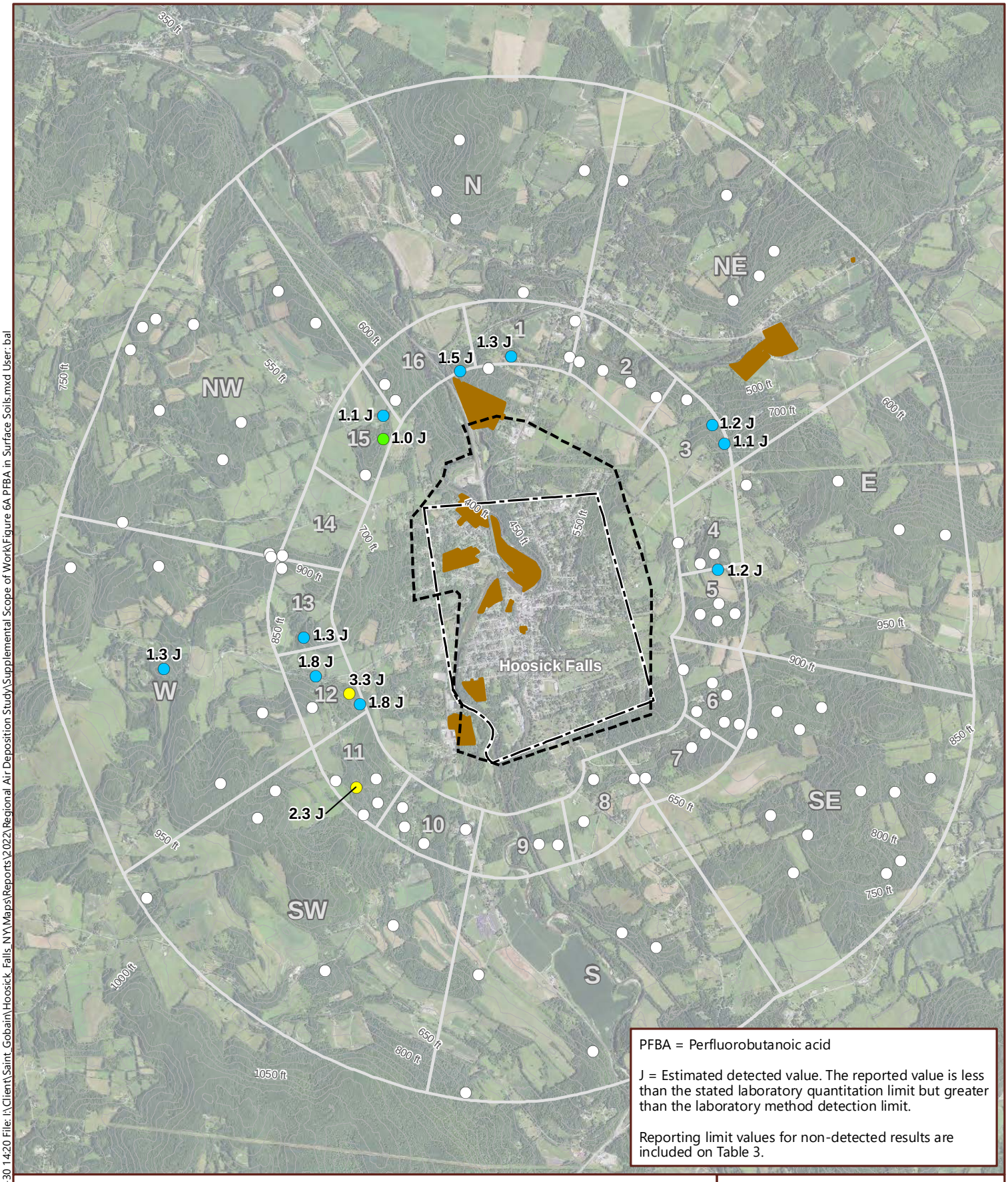
- ND
- 0 - 0.80
- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000
Feet

ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 5C

**PFOS IN SUBSURFACE SOILS**
Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY




PFBA = Perfluorobutanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFBA Concentrations**

- ND
- 0 - 1
- > 1 - 2
- >2 - 3.3

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000

Feet

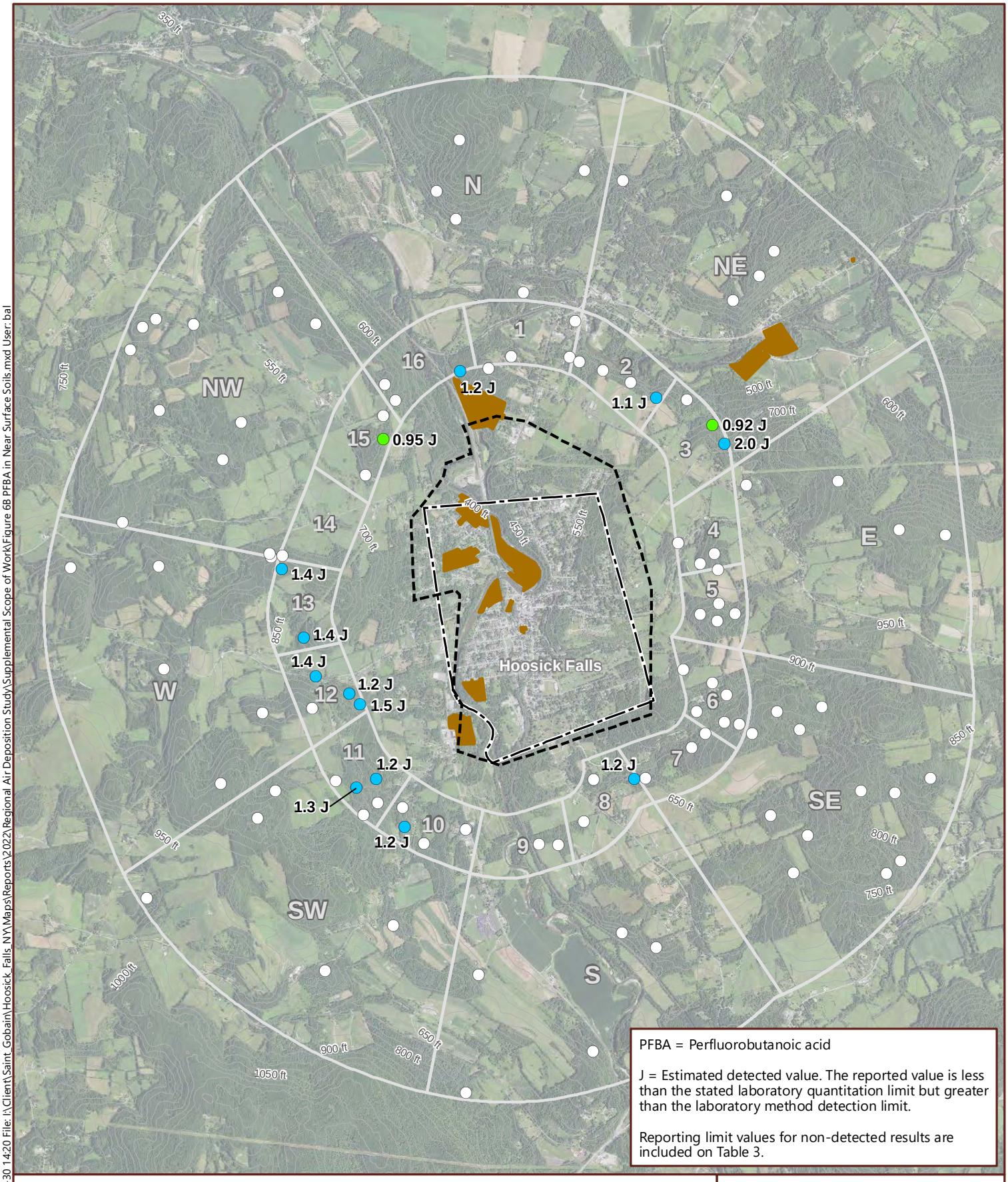
ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 6A

**PFBA IN SURFACE SOILS**

Data Summary Report for the Supplemental Scope of Work: Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-08-30 14:20 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\Regional Air Deposition Study\Supplemental Scope of Work\Figure 6A PFBA in Surface Soils.mxd User: bal




PFBA = Perfluorobutanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFBA Concentrations**

- ND
- 0 - 1
- > 1 - 2

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000
Feet

ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 6B

**PFBA IN NEAR SURFACE SOILS**
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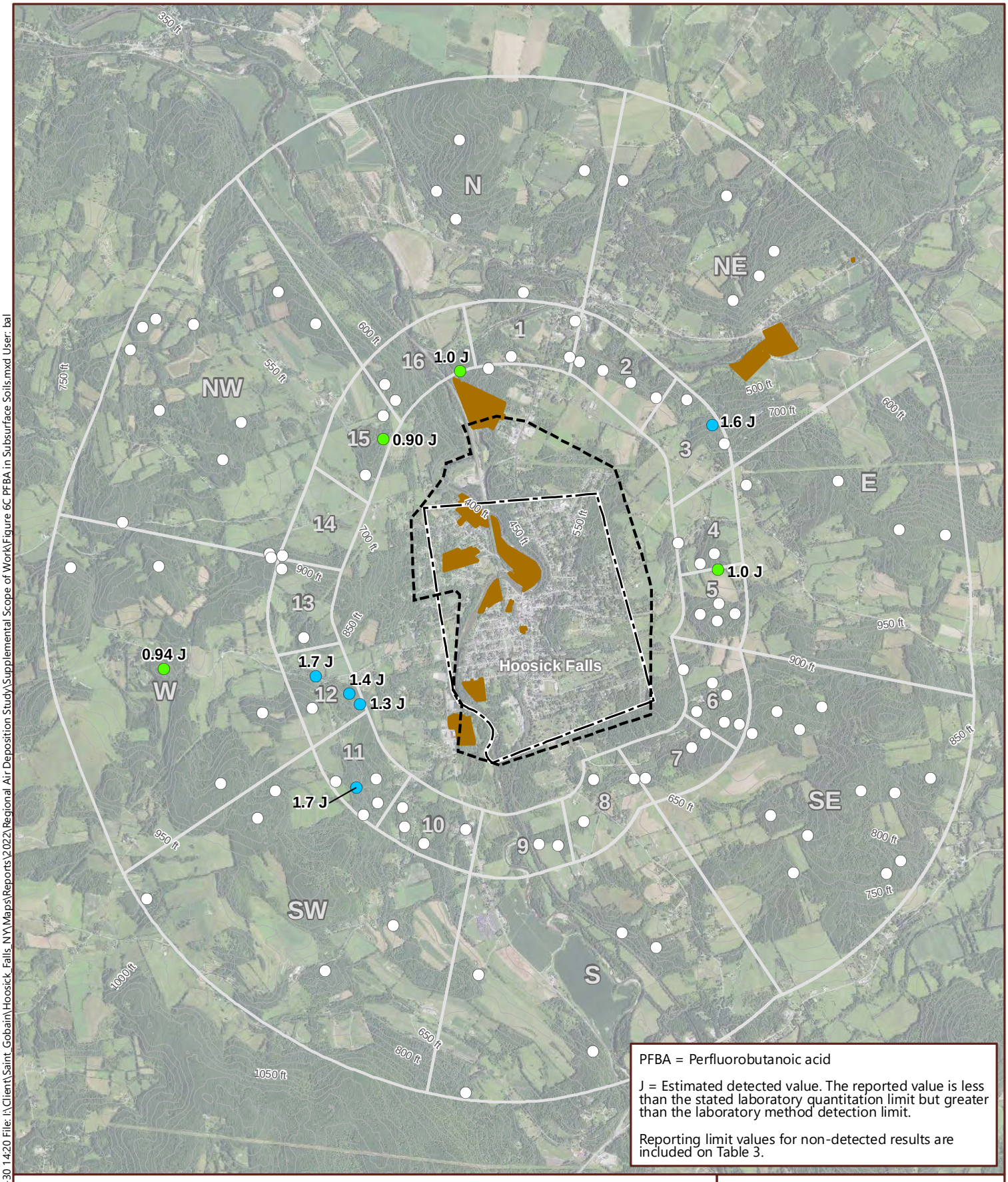


PFBA = Perfluorobutanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFBA Concentrations**

- ND
- 0 - 1
- >1 - 1.7

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000

Feet

ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 6C

**PFBA IN SUBSURFACE SOILS**

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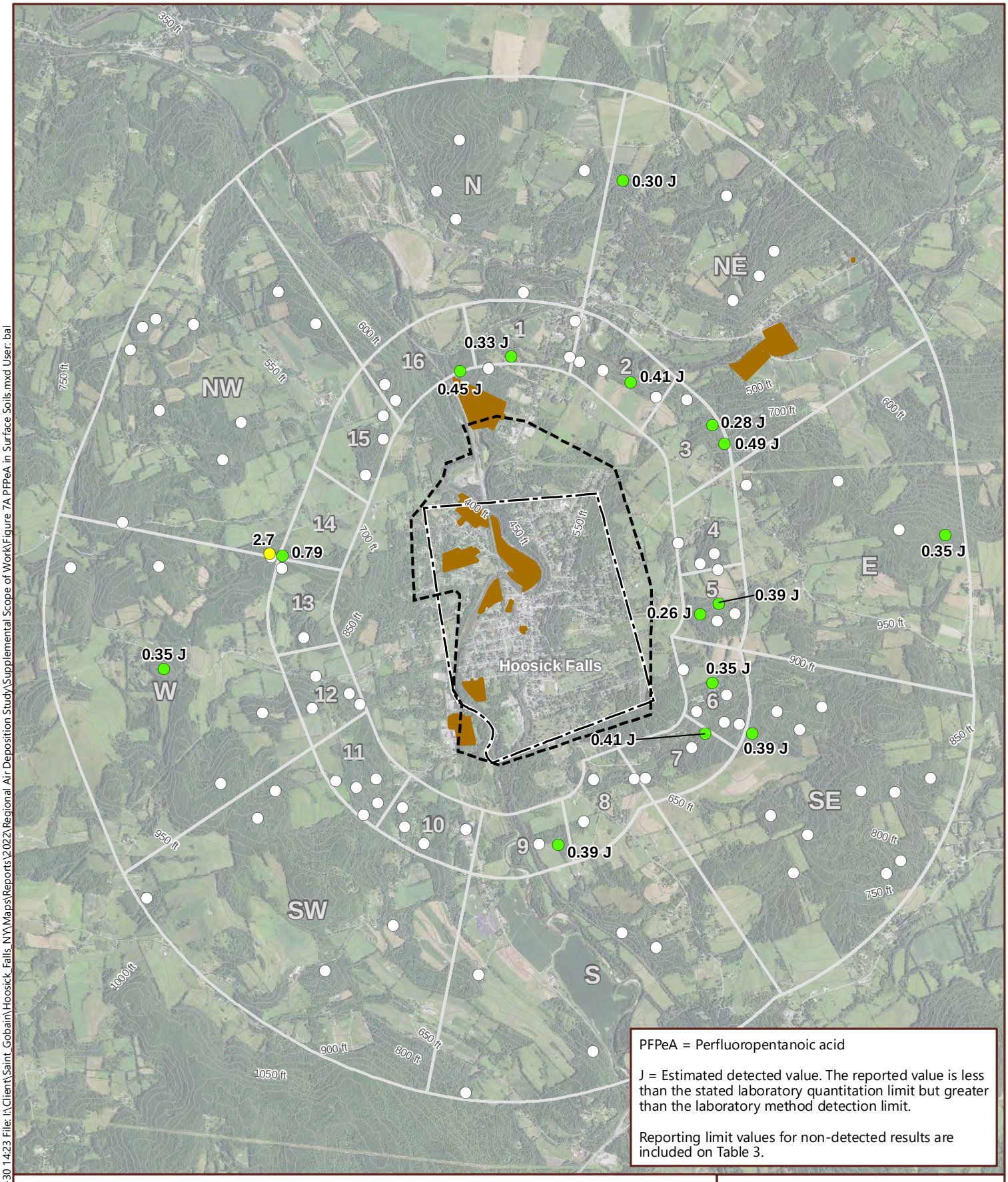


PFPeA = Perfluoropentanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFPeA Concentrations**

- ND
- 0 - 1
- >1 - 2
- >2 - 2.7

- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000
Feet

ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 7A

**PFPeA IN SURFACE SOILS**
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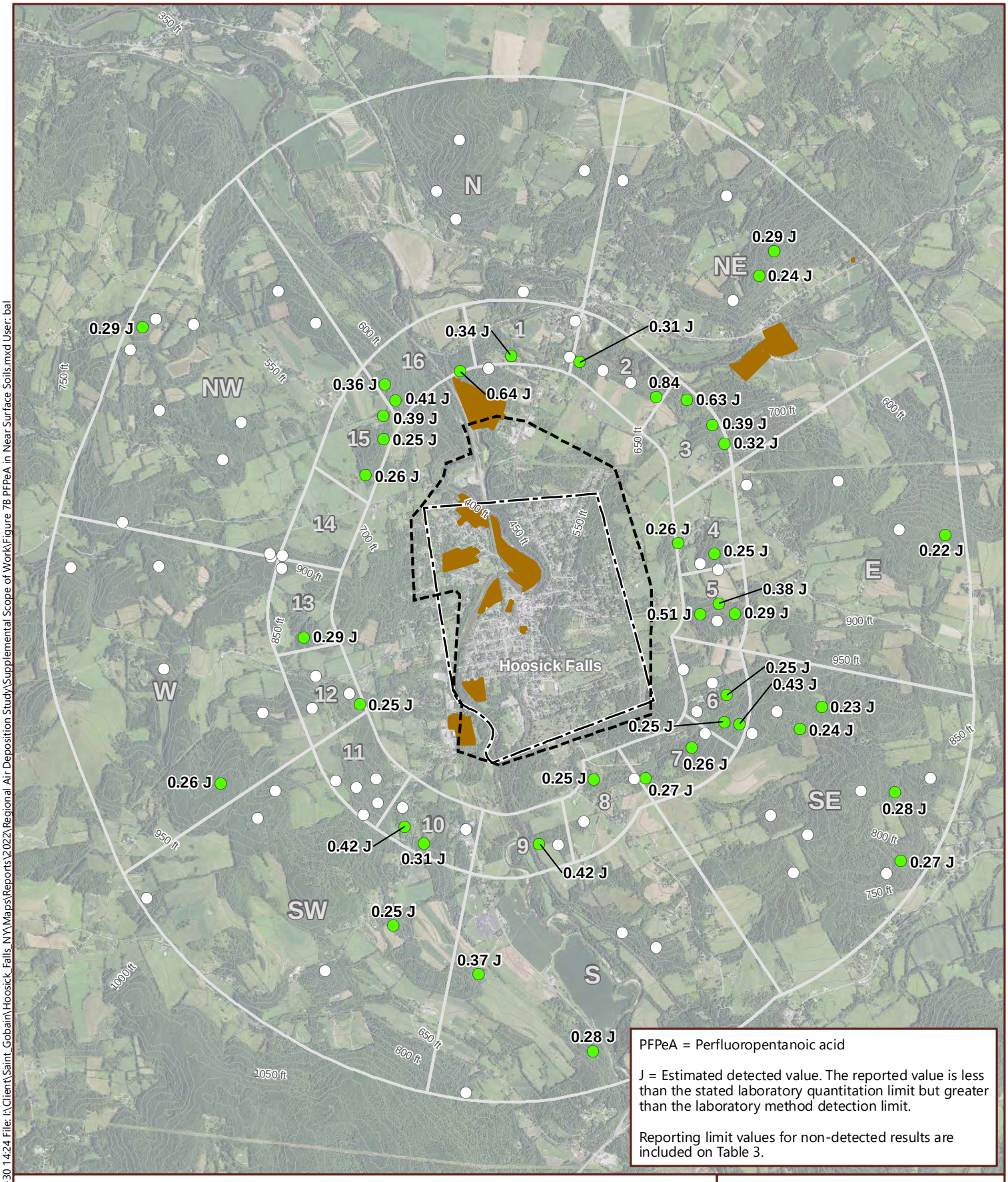


PFPeA = Perfluoropentanoic acid

J = Estimated detected value. The reported value is less than the stated laboratory quantitation limit but greater than the laboratory method detection limit.

Reporting limit values for non-detected results are included on Table 3.

**PFPeA Concentrations**

- ND
- 0 - 0.84
- Soil Sampling Sector Boundary
- Current OU-01 Boundary
- Sites of Interest
- Hoosick Falls Village Limits

0 2,000 4,000 6,000
Feet

ppb = parts per billion and nanograms per gram (ng/g).

FIGURE 7B

**PFPeA IN NEAR SURFACE SOILS**
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